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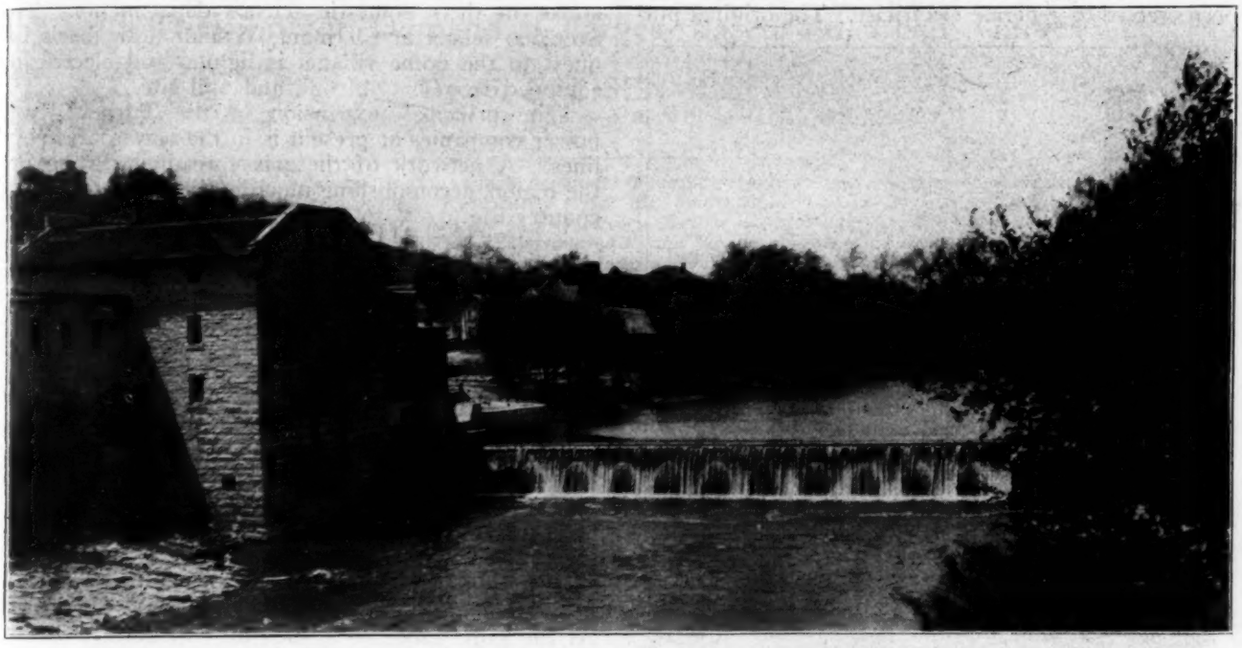


First Mill Built North of Dubuque, Iowa—Now Housing the Electric Power Plant of Schmidt Brothers, Elkader, Iowa.

Utilizing Old Mills for Hydroelectric Power Plants

Famous Flour Mills in Northeastern Iowa Converted to Electric Service—Transmission Lines Supplying Extensive Farming Districts Are Fed from the Remodeled Mills—Features of the Modern Service

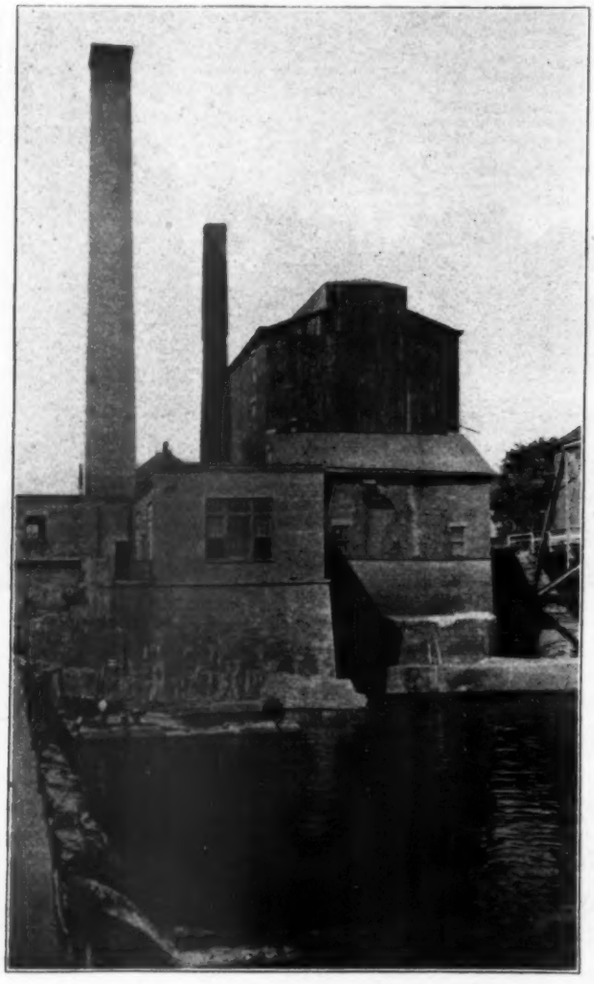
By F. L. CLARK

AN INTERESTING electrical development in Iowa is the utilization of old flour mills and mill sites in the northeastern part of the state as hydroelectric plants.

Most of Iowa is level or slightly rolling prairie, but the topography of the four most northeastern counties is quite different. The Switzerland of Iowa it is called. Many swift streams and rivers have cut deep channels in the bluffs and the gentle contour of the land breaks into rocks and crags, forested hills and fern-carpeted dells. In early days before the railroads had built west of the Mississippi, these swift streams played an important part in the settlement of northern Iowa and southern Minnesota. Wheat was the great crop of the pioneers but with no railroads they were without a market and the crop was worthless in the beginning. But the rocky-banked, swift running streams solved the situation. Mill sites were found everywhere and mills, big and little, sprang up all over the northeastern corner of the state. In just one of the four northeastern counties there were 58 at one time—saw mills and flour mills together. Most of these were small affairs serving only local uses and disappeared with the decline of wheat growing. A few of the larger ones continued doing business for a good many years.

Of this number the two largest and most famous were the mills built on the Turkey River by Messrs. Thompson, Sage and Davis at Elkader and Clermont. The Elkader mill was built 75 years ago and at the time was the largest mill west of the Mississippi in the Northwest. Some years later the Clermont mill was erected and was a great success. The proprietor of this mill, William Larrabee, later was twice governor of Iowa. Farmers came from as far as 150 miles to have their wheat ground at these mills.

Both mills were built out of rough rock dug from the hillsides of the Turkey River. They were well built to stand the test of time. After years of usefulness as flour mills, they have recently taken a new lease on life and entered upon a career of a new character. The old buildings, apparently good for a hundred years, are now housing electric power plants and on the site of the old log dams which used to hold the water to turn the big wooden water wheels of the mills, handsome structures of concrete and steel have been erected to generate electricity. The original pur-



Power Plant of C. C. Miller & Sons at Claremont, Iowa, Formerly Owned by Governor Larrabee.

pose of helpfulness to the farmer is not lost, for electric light and power is supplied to many of the same farms which used to send wheat to the mills in former years.

The company at Clermont is composed of Chris Miller & Sons, who have recently incorporated with the name of the Northeastern Iowa Power Co. The Elkader power plant is owned by the Schmidt Brothers. The transmission lines of the two companies serve adjoining territory in northeastern Iowa. The Schmidt company supplies Guttenberg, Elkader, Garnavillo and a score of smaller towns and villages. The Northeastern Iowa Power Co. has over 200 miles of transmission lines and serves West Union, Fayette, Clermont, Elgin, Fort Atkinson, Lawler, Edgewood, Hawkeye and lesser towns in the same territory. In addition to their power plant at Clermont, the Millers now have a plant at Waucoma and have converted another old mill on the Volga River into a second subsidiary plant. The Schmidt Brothers have purchased a second power site on the Turkey River and expect soon to expand their system. The two power plants are supplying power to many creameries, cheese factories and small manufacturing concerns of various kinds, such as saw mill, planing mill, overall factory, excelsior mill, sash and door factory and ice plant. Several rural consolidated schools are provided with light and motor service and have electric stoves in their domestic science departments. The $100,000 school at Clermont, William Larrabee's bequest to the home village, is lighted and electrically equipped from his old mill and mill site.

The principal expansion of the Turkey River power companies at present is in the way of farmers' lines. A network of these is spreading throughout the region, accomplishing much in the improvement of country life.

MOVING FREIGHT TONNAGE ELECTRICALLY IN LARGE UNITS.

Pair of Pennsylvania Railroad's New 250-ton Electric Locomotives Can Haul 6300-ton Train Up Grade at 20 Miles an Hour.

The ability to increase track capacity for the rapid expedition of heavy freight trains is fast becoming a difficult problem, owing to the tremendous increase in train tonnages to be moved as a unit. In other words, the problem before many steam-railroad operators is how to increase the physical capacity of a certain heavy-tonnage division without prohibitive expense. At the same time, after such an expenditure in correcting alinement, grade reductions and other operating difficulties, there still remains the problem of operation, namely, hauling without delay the tonnage offered for transit.

With the introduction of the large type FF1, 250-ton electric locomotive of the Pennsylvania Railroad recently exhibited at the Master Mechanics' and Master Car Builders' convention held at Atlantic City, there dawns a new era in the possibility of moving heavy tonnage in large units over steep grades. Here is motive power equipment of tremendous capacity having a maximum accelerating power of 7600 hp., with a sustained capacity of 4800 hp. for one hour. With two of these big electric engines a 6300-ton train can easily be handled up long grades at constant speed as, for instance, on a 25-mile 1% grade, such a train could be moved at 20.6 miles per hour. Thus there exists equipment for hauling traffic in much larger units and with the rapid movement of such large quantities of freight the division can rapidly become cleared and made ready to handle considerable additional tonnage.

The Pennsylvania type FF1 locomotive was built within existing operating limits reaching the maximum starting draw-bar pull which average freight cars will permit; the maximum tractive effort consistent with the wheel arrangement used; the maximum weight on drivers; the maximum horsepower per unit weight and the maximum speed considered desirable with the contemplated operation.

This locomotive was designed under the general direction of J. T. Wallis, general superintendent of motive power, Pennsylvania Railroad, together with B. G. Lamme, chief engineer, Westinghouse Electric & Manufacturing Co.

Central-Station Rates in Theory and Practice

Fourth Article—Responsibility for Peak Load—Apportioning the Demand Cost Among the Customers—Theoretical Division of Demand Charges Based on Load Curves

By H. E. EISENMENGER

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This is the fourth article of this series, which began in the issue of July 12, and will appear weekly practically throughout the present volume. A general outline of the entire series was published in the issue of July 5. In the first three articles the author first discussed costs in general, then the cost of electric service in particular, dividing the latter into three elements —energy, demand and consumer costs. The present article continues the consideration of demand costs and shows how they are apportioned among different classes of customers and among individual customers. This discussion will continue through several more articles. After a knowledge of costs has been obtained, the price of electric service (rates), which depends largely on the costs, will be taken up.

PART I—THE COST OF ELECTRIC SERVICE—Continued.

II—A. The Three Elements of Cost.

B. THE APPORTIONMENT OF THE DEMAND COST BETWEEN THE CUSTOMERS.

1. *The Peak Responsibility.*

SECTION 26. The most important object of the computation of the cost of service is the ultimate apportionment of that cost between the consumers, that is to say, the determination of the share of the cost which is caused either by an individual consumer or by a certain group of consumers, for instance by the power consumers. Unless we go into theoretical details of little practical importance, this apportionment is simple and easy in case of the energy cost, where it has to be made simply according to the number of kilowatt-hours, but it is less simple, theoretically as well as practically, in case of the demand cost.

Since the total demand cost is proportional to the central station's peak load, the demand of a group of consumers or of an individual consumer is apparently proportional to the share which is contributed by that group or individual to the peak load of the central station.

Now, the peak load of the central station is built up of the sum of the amounts of power required by the individual consumers at the central station's peak-load time, enhanced by the line and transformer losses and the power demand of the central station for its own operating purposes. If a consumer is using 100 kw. at the central station's peak-load time, the central station has to keep 100 kw. (plus a percentage enhancement for the above-named losses, etc.) of capacity ready for his use and for *his* use only, regardless of whether he is using these 100 kw. during the peak-load hours only or for 365 24-hour days a year[1]. If the total capacity of the central station and lines, etc., is, for instance, 10,000 kw., the demand cost of that consumer will be 1% of the total demand cost of the central station; if he uses 200 kw. at the central station's peak-load time, his demand cost will be 2%, and so forth; in short, it will be proportional to the capacity used by him at the central station's peak-load time.

The demand of a customer at the time of the central station's annual peak load is therefore a very important factor for the theory of the demand cost. It defines the measure in which the consumer is responsible for the building up of the central station's peak and it has therefore very properly been called the *"Peak Responsibility."* This very descriptive name will be used hereinafter for the consumer's demand at the central station's peak-load time. Thus, if the lower curve in Fig. 1 would represent the load curve of an individual consumer or the aggregate load curve of a certain group of consumers, and if the upper curve would be the total load curve of the central station, $d_p = M'k$ would be the "Peak Responsibility" of that consumer or group of consumers.

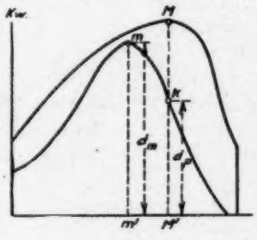


Fig. 1.

2. *The Theoretically Exact Basis.*

27. If we give further thought to the problem of the demand cost, we will soon find that it is not the peak responsibility alone which has a bearing on the demand cost of a consumer. The following hypothetical example will explain the general idea.

Assume a 1000-kw. central station to have two consumers or classes of service only: *"A"* using 500 kw. from 5 to 6 o'clock every afternoon and nothing outside of that time, and *"B"* using 500 kw. for 24 hours every day. The peak load of the central station occurs then during the hour from 5 to 6 p. m., and the peak responsibility of each one of the two consumers

[1]This statement will have to be revised and slightly modified in the following paragraphs (see also Insert VI), but for the purpose of a first introduction it is of sufficient accuracy.

is 500 kw. If we were to judge by the peak responsibility alone, the central station's demand charges would have to be equally divided between the two consumers. It is clear, however, that the central station could take on new consumers without increasing its total capacity and demand cost, if these new consumers never exceed an aggregate demand of 500 kw. and if all their demand occurs outside of the hour from 5 to 6 o'clock. They are then making use, so to speak, of the 500 kw. which are "charged" to *A*. (It should be remembered that we are dealing here with the cost and not with the price, so that the term "charge" is here not used in the meaning of "price-making" but only in the book-keeping sense of apportioning the cost.) The shape of consumer *B*'s load curve does not permit any other consumer to use the portion of the central station's peak load for which *B* is "charged," because, according to the assumption, *B* never releases that portion for the use of others. It seems logical, therefore, that *B* should be "charged" for a larger portion of the demand cost than *A*, although they both have the same peak responsibility.

We will always find corresponding conditions wherever there is a diversity between the consumers[2], in other words, where the load curve of the respective consumer is not entirely similar in shape to the central station's load curve.

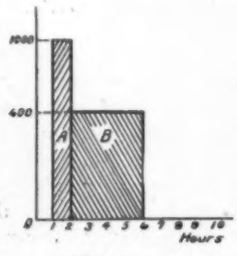


Fig. A.

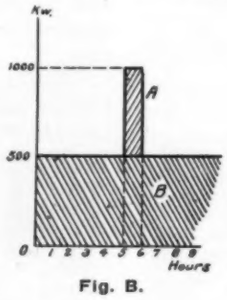


Fig. B.

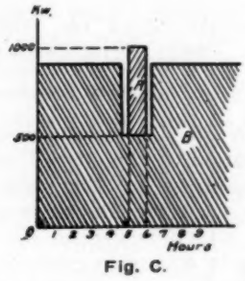


Fig. C.

28. The solution of the problem to find the real value of the consumer's demand cost requires a rather complicated, though by no means difficult, mathematical analysis, which is given in Insert VI, together with the resulting full solution of the problem. A synopsis of the results of this mathematical analysis is contained near the close of Insert VI. Condensing these results still more and expressing them in non-mathematical terms with a corresponding loss of preciseness, we can say that a consumer's demand cost is not determined exclusively by his load at the central station's peak-load time but also by the amount of his load at such times when the central station has to carry a load which is nearly as large as the peak. The demand cost of a consumer is influenced by the amounts of his load *at every single moment of time*, but the influence decreases steadily according to a certain law as we proceed from the element of time at which the central station's load is a maximum (peak load) to such elements at which the central station's load is smaller. The influence of the consumer's momentary load at such moments of time when the central station's load is near its maximum is paramount, whereas at such times when the central station's load is not a large percentage of the peak load that influence becomes insignificant or practically imperceptible.

29. It follows from this that, if the peak of the central station's load curve is more or less a sharp point, the peak responsibility of a consumer is of greater relative influence on his demand cost than if the central station's load curve has a well rounded-off top which extends over a comparatively long period.*

Insert VI—Appendix to Section 28.

APPORTIONMENT OF THE DEMAND COST TO THE INDIVIDUAL CONSUMERS, CONSIDERING THE SHAPES OF THE LOAD CURVES (DIVERSITY-FACTOR).

CONTAINING ELEMENTARY MATHEMATICS.

It is easily shown that the "Peak Responsibility"[1] is not the theoretically correct measure for the demand charge of a certain consumer.

Starting with the assumption of the simple case that the central station has only two consumers *A* and *B* with a plain rectangular load curve each, as per Fig. A, it might be believed at first sight that consumer *A* has to carry the demand charges alone, whereas *B* is using only a part of the central-station capacity which has to exist anyway in order to serve *A*. The possibility of serving *B* will therefore be only a by-product.[2]

That this way of reasoning is wrong can be easily seen if we assume that *B* is increasing his demand gradually up to 800, 900, 990 and 999 kw. As soon as he has gotten so far, the slightest increase of his maximum demand would throw the whole demand charges[3] onto his shoulders and *A* would just as suddenly be entirely relieved of demand charges, if the above way of reckoning were correct. If *B*, then, should slightly reduce his demand by one or two kw. the whole conditions would be reversed again.

Evidently these unstable conditions are not only theoretically incorrect but also commercially unsound. The correct point of view can be obtained from the following reasoning:

Let us assume again that the central station has only two consumers *A* and *B*, each of which is using uniformly 500 kw., but, whereas *A* is using his demand only during one hour of the day, from 5 to 6 o'clock, *B* is using his load continually 24 hours a day (Fig. B). Evidently *A* should then be charged less for demand than *B* because such new customers as can be taken on without increasing the capacity of the central station will draw their demand

*The reader who, for one or the other reason, does not care to go into the mathematics of Insert VI may check this statement by considering the obvious facts in the following extreme example: If we assume the load curve of the central station to be a horizontal straight line (100% load-factor), then obviously we have the extreme case of the rounded-off peak and the demand cost of every consumer in that particular case is evidently proportional to his kilowatt-hour consumption because there is no particular moment discernible at which we could assume the peak responsibility to take place. The influence of the consumer's load at any particular moment is therefore in that case not larger than of that at any other moment.

[1]For the definition of this term see Section 26 of the main text.

[2]This would be as logical as if we would charge the first-coming passenger on a car with all the expenses of running that car and let the others ride free, arguing that the car has to run anyway in order to serve the first-coming passenger and the resulting possibility of carrying the later-coming passengers is only a by-product.

[3]Where the term "Charge" occurs in the text of this investigation it is always to be understood in the accounting sense of the word, that a consumer is considered to be the cause of a certain amount of demand cost but not in the sense that he ought to be made to pay that or any other amount. The cost, moreover, is the average cost and not the increment cost. Price-making is distinctly different from cost apportionment on account of the entering of the element of "Value-of-Service." (This will be taken up in Part II of this series of articles—"The Price of Electric Service.")

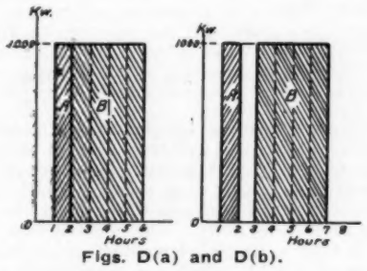
[2]For the explanation of the term "diversity" (diversity-factor) see Insert VI and later Sections 42 to 49.

from that part of the central-station capacity which is being used by *A*, whereas *B* uses his part of the central station all for himself. If both the consumers, *A* and *B*, had the same load curve as *B*, the central station would not have the possibility of taking on any new consumers at any time without increasing its capacity. This principle becomes still more clear if we assume the load curve of the two consumers to be as represented in Fig. C. The "Peak Responsibilities" of *A* and *B* in this case still are 500 kw. each and yet it is evident that *B* should pay higher demand charges than *A* since by the shape of his load curve he is crowding out practically all possibility of taking on any new consumers with the given capacity of the central station. This possibility has been left open to a large extent by consumer *A*, but is utilized by *B* for his own purposes[4].

Finding the Proper Demand Charge Based on the Consumer's Load Curve.

The value of the proper demand charge which ought to be assessed to a customer as cost considering the shape of his load curve, will be found by the following line of reasoning.

Let us again assume two consumers only being on the lines, with a maximum demand of, say, 1000 kw. each, and the shape of the load curves of these two consumers be as indicated in Fig. D (a) or D (b). The total capacity of



Figs. D(a) and D(b).

the central station is then also 1000 kw., and the "Peak Responsibility" of each one of the consumers amounts to the same number of kilowatts. It does not need any elaborate proof that in this case 1/5 of the total charge will have to be charged to *A* and 4/5 to *B*[5].

The matter becomes a little more complicated if we assume two customers with the load curves as indicated above in Fig. A. There will be no doubt as to how the demand charges are to be distributed in this case, if we consider the central-station capacity as consisting of two parts, one of 600 kw. which is being used by both *A* and *B*, and another one of 400 kw. which is for the use of *A* only. *A* will then be charged for

$$(1/5 \times 600) + 400 = 520 \text{ kw.}$$

and *B* for $4/5 \times 600 = 480$ kw.

Together 1000 kw.

We see that the demand cost which is to be charged to a certain consumer may always be expressed by a certain number of kilowatts. This number of kilowatts will be called the *"equivalent demand."* If, for instance, we had two 24-hour consumers, one with 520 kw. continuous demand and the other with 480 kw. continuous demand, the demand cost would be distributed between the two consumers in the same way as in Fig. A and for that reason the term "equivalent demand" has been chosen. Obviously, the sum of all equivalent demands must be equal to the sum of the peak responsibilities or, in other words, to the central-station peak (disregarding in that latter case the transmission and distribution losses).

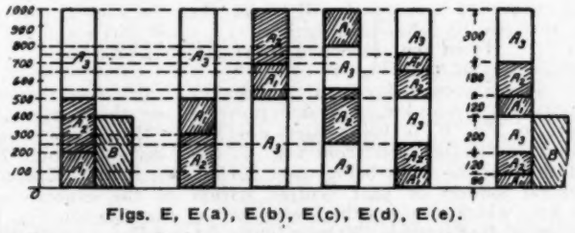
Some doubt might arise, however, as to whether the given load curve of *B* should be really drawn for that purpose as indicated in Fig. A, since there is an infinity of other ways in which a load curve might be drawn for the same load. Some typical examples of the different ways of drawing the load curve of customer *B* of Fig. A are shown in Figs. A(a) to A(g).* In the "Note"* at the end of this Insert it will be fully explained what effect these different methods of drawing the load curves would have on the distribution of the demand charges, and the proof is given there that the method as used Fig. A is the correct one. In other words, we arrive at the principle that all curves should be drawn in the customary way, that is starting all ordinates from the axis of the abscissae.

Let us assume as the next step that we have four consumers on the lines, and not more, all of which again shall have a plain rectangular load curve. Three of these consumers A_1, A_2 and A_3 have this in common that they are drawing their current all at the same hour, as shown in Fig. E. These consumers will, for convenience, be called "*A*-consumers" hereafter. The fourth consumer *B* is using his demand at some other hour for the same length of time. The amounts of the demand of each consumer in kilowatts can be seen from Fig. E. We can again subdivide the total capacity of the central station of 1000 kw. into two parts as has been done in Fig. A, one part-station of 400 kw. (lower part of Fig. E) being used by the *A*-consumers first and later by *B*, whereas the other part-station, of 600 kw. (top part of Fig. E), is used only by the *A*-consumers and then stands idle during the rest of the day.

The demand cost for the first part of the central station will have to be divided into equal parts, between *B* on the one hand and the *A*-consumers on the other hand. It is unknown so far in what proportion the three customers *A* have to divide their half of the charges for 400 kw. between them.

The second part of the central station has a capacity of 600 kw. and the demand charges for this have to be paid by the *A*-consumers to the exclusion of B. Here again it is unknown as yet in what relation A_1, A_2 and A_3 ought to divide up these expenses between themselves.

We can no longer, of course, resort to the expedient of just choosing the lower part of the load curve of the *A*-consumers as the part which is to be charged to the latter and to *B* in common (as has been done in Fig. A), since we can pile the load curves of the individual *A*-consumers upon each other in an infinite variety of ways, some of which are shown as examples in Figs. E (a) to E (d). Obviously, each of these methods would then have a different effect upon the distribution of the demand charges.

Evidently those *A*-consumers who are using that part of the central station which is also used at another hour by consumer *B* will find themselves at an advantage, so to speak, since they are charged only one-half of the amount

Figs. E, E(a), E(b), E(c), E(d), E(e).

per kilowatt as if they had to use that part of the central station which is used only by consumer *A*[6].

It appears logical, therefore, to allow each one of the *A*-consumers to partake of that favored 400-kw. portion in proportion to his own maximum demand. In other words, we divide the total capacity of 1000 kw. into two part-stations, one of 400 kw. which is used by the *A*-consumers and by *B*, and the other one of 600 kw. which is used by the *A*-consumers alone. We then allot a proportional share of each one of these two part-stations to each one of the *A*-

[4]Readers who have not given much attention to this problem may find it paradoxical that a consumer with a large load-factor (referring the load-factor to the peak responsibility instead of to the maximum demand, as usual) shall be charged with a higher demand cost per kilowatt than another consumer with a smaller load-factor. It has been our mental habit to consider the consumer with a high load-factor a "favorable" one who causes smaller cost than the low-load-factor consumer. We must, however, not confuse the "demand cost per kilowatt" with the "total cost per kilowatt-hour." Even under the theoretically correct principle, explained above, the total cost per kilowatt-hour will be considerably lower for the consumer with large load-factor than for the consumer who with a comparatively large peak responsibility consumes only a small number of kilowatt-hours.

[5]The reader should keep in mind that this Insert is dealing with the distribution of the cost and not with the apportionment of prices.

As regards price-making, the possibilities of using the same central-station capacity at different hours for different customers should be considered as co-ordinated by-products (see Section 4 of the first of these articles) and the price should be made according to the Value-of-Service principle (see later, Part II of this series of articles).

*To be printed in the next issue.

[6]It should be distinctly understood that this investigation deals with the computation of the demand cost which the consumer causes to the central station and not with the demand charges which the central station should make to the customer as a price. The cost, however, is an important, though not the only factor for determining the price (see Part II of this series: "The Price of Electric Service") and the consumer who causes a smaller cost is liable to be charged a smaller price on the average.

consumers. Thus, for instance, consumer A_1 who with his 200 kw. is using 20% of the total capacity of 1000 kw. shall get 20% (=80 kw.) of the 400-kw. station, and 20% (= 120 kw.) of the 600-kw. station. A_2 shall get 30% of each one of the two stations (120 and 180 kw., respectively) and A_3 50% (200 and 300 kw., respectively). This distribution is indicated in Fig. E (e). It is easy now to find out what the charges for each one of these four consumers ought to be, as follows:

A_1	80/2 + 120	= 160 kw.
A_2	120/2 + 180	= 240 kw.
A_3	200/2 + 300	= 400 kw.
B	400/2	= 200 kw.
		1000 kw.

Let it now be assumed as the next step that we have a larger number of consumers on the central station, as per Fig. F. During the first hour we have any number of consumers A_1, B_1, ... E_1, but all with rectangular load curves, using current during the whole hour; these load curves are piled on each other. During the second hour there are also a number of consumers, let us say three: A_2, B_2, C_2, with the same character of load curve as just explained. In the same manner we have a certain number of consumers in every following hour up to and including the n^{th} hour (A_n, B_n). Let the small letters a_1, b_1, a_2, b_2 .... indicate the number of kw-hr. (or maximum demand, or average demand, which in this case is the same) of every respective customer. Let it be further assumed that h_1, h_2, h_3 be the aggregate number of kilowatts used during each one of these periods as indicated in Fig. F. Let it be further

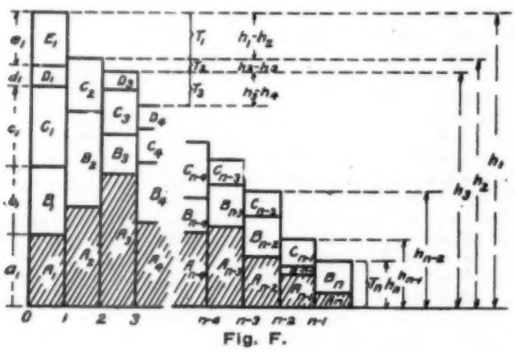


Fig. F.

assumed that the groups of consumers as indicated by corresponding indices are arranged in the order of their aggregate size so that $h_1 > h_2 > h_3 > h_4 > \ldots\ldots$

What will then be the equivalent number of kilowatts, K_{a1}, for which customer A_1 will have to be charged?

The total capacity of the central station necessary for all customers mentioned will be h_1. Let the central station of this size be subdivided again into n small part-stations T_1, T_2 .....T_n of the respective sizes (h_1-h_2), (h_2-h_3), ... $(h_{n-1}-h_n)$, h_n (see Fig. F).

The first-named central station T_1, which has the capacity of h_1-h_2 kw. and is represented as the uppermost part in Fig. F, is being used not longer than during one hour, as can be seen from Fig. F. The second station T_2, of the size h_2-h_3 is being used during two hours. The n^{th} central station or part central station of the capacity of h_n kw., which occupies the lowest part of the diagram Fig. F, is being used during all the n hours. According to what has been said above, we will have to apportion a certain part of the demand of A_1 to the first-named central station T_1, another part of A_1 to the second T_2 and so on, a certain part to each one of those past central stations. The size of the part of A_1 apportioned to the top central station T_1 will be $a_1 \times \frac{h_1-h_2}{h_1}$. The part allotted to the second central station T_2 will be $a_1 \times \frac{h_2-h_3}{h_1}$, and the part belonging to the last central station T_n will be $\frac{h_n}{h_1}$. The demand cost for the part apportioned to the first central station will have to be charged to A_1 alone. Of the demand cost of the central station T_2, only one-half will have to be charged to customer A_1, whereas the other half is charged to such other customers as are using central station T_2 during the second hour. In the same manner we will continue and finally find that the charges for that part of a_1 which is allotted to the n^{th} or bottom central station are divided into n parts of which only one is to be paid by customer A_1.

The total charges of A_1 expressed in equivalent kilowatts (that is, the "equivalent demand" in kilowatts) are therefore

$$K_{a1} = \frac{a_1}{h_1}\left[\frac{h_1-h_2}{1} + \frac{h_2-h_3}{2} + \frac{h_3-h_4}{3} + \frac{h_m-h_{m+1}}{m} + \ldots \frac{h_{n-1}-h_n}{n-1} + \frac{h_n}{n}\right]$$

In the same manner the equivalent maximum demand for A_2 will be found as

$$K_{a2} = \frac{a_2}{h_2}\left[\frac{h_2-h_3}{2} + \frac{h_3-h_4}{3} + \ldots \frac{h_m-h_{m+1}}{m} + \ldots \frac{h_{n-1}-h_n}{n-1} + \frac{h_n}{n}\right]$$

or, in general, of the customer A_m

$$K_{am} = \frac{a_m}{h_m}\left[\frac{h_m-h_{m+1}}{m} + \ldots \frac{h_{n-1}-h_n}{n-1} + \frac{h_n}{n}\right]$$

Let now all the consumers characterized by the letter A (that is A_1, A_2, ... A_n) be combined into one new consumer A, whose load curve is represented by the shaded part of Fig. F. Then evidently the demand charge of this consumer A is the sum of the demand charges of A_1, A_2, ... A_n, and the equivalent maximum demand of A is the sum of $K_{a1}+K_{a2}+\ldots+K_{an}$.

If we call the quotients $\frac{a_1}{h_1}$, $\frac{a_2}{h_2}$, ... $\frac{a_n}{h_n}$ for the sake of brevity $q_1, q_2, \ldots q_n$, then we get by carrying out the addition of $K_{a1}+K_{a2}+\ldots+K_{an}$:

$$K_a = (h_1-h_2)q_1 + (h_2-h_3)\frac{q_1+q_2}{2} + \ldots + (h_m-h_{m+1})\frac{q_1+q_2+\ldots q_m}{m} +$$

$$\ldots + (h_{n-1}-h_n)\frac{q_1+q_2+\ldots+q_{n-1}}{n-1} + h_n\frac{q_1+q_2+\ldots q_n}{n} \ldots (1)$$

In order to get a method of geometrical construction for this formula we proceed as follows: q is an abstract number and in order to represent it geometrically we have to select a certain length as unity. For reasons which will become obvious later it is most convenient to select the capacity of the central station h_1 as unity. The construction of the value $q_m = a_m/h_m$ is then a simple elementary procedure.

Those parts of Fig. F which are essential for the following have been repeated in Fig. G, that is, the total load curve (staggered curve h) and the load curve of customer A (staggered curve a). The amounts for q are entered into Fig. G as dash and dot lines. Evidently for the first interval of time OI, q and a are identical on account of the choice of the unity.

The term $(q_1 + q_2 + \ldots\ldots + q_m) / m$ obviously represents the arithmetical mean of the ordinates q between the abscissa O and the abscissa of the end of the m^{th} interval of time. This term will, for the sake of brevity, be called f_m hereafter. Thus, for instance, f_3 in the third interval of time is found as the arithmetical mean of q_1, q_2 and q_3 or $(q_1 + q_2 + q_3) / 3$. The curve of f is also entered in Fig. G.

Introducing the term $f_m = (q_1 + q_2 + \ldots\ldots q_m) / m$ into equation (1) we have

$$K_a = (h_1-h_2)\,f_1 + (h_2-h_3)\,f_2 + \ldots\ldots\ldots (h_m-h_{m+1})\,f_m + \ldots\ldots (h_{n-1}-h_n)\,f_{n-1} + h_n f_n \quad (1^*)$$

If we step off now (Fig. G) the length $f_1 = OF_1$ horizontally to the left from the point H_1 (situated on the axis of ordinates) as $H_1\,g_1\,G_1\,H_2$ will by its area represent the first term $(h_1 - h_2)\,f_1$ of equation (1*).

In the same manner, if $H_2\,g_2$ is made equal to f_2 of the second interval 1-2 of time, the rectangle $H_2\,g_2\,G_2\,H_3$ represents by this area the second term $(h_2 - h_3)\,f_2$ of equation (1*).

By stepping off the lengths f_1, f_2, f_3 .....f_n horizontally in the manner indicated, we get the shaded surface in Fig. G, the area of which is a measure of K_a according to equation (1*). The length OH_1 has been assumed as unity. If, therefore, the shaded area in Fig. G is transformed into a rectangle over the base OH_1, the height of this rectangle will be equal to the equivalent demand K_a of customer A. The kilowatt scale will be the same as that of the load curves.

The intervals of time 0-1, 1-2, 2-3,.....(n—1)-n, in Figs. F and G have been assumed so far for the sake of convenience to be of one hour's duration. Evidently, however, the absolute lengths of these intervals have nothing to do with the above reasoning as long as the intervals are equal among each other. We can, therefore, without influencing the result, reduce the lengths of these intervals more and more, at the same time increasing their number, until we get down to differentials. This will change the staggered curves of Fig. F and G into smooth continuous curves (Fig. H†).

Nor has the order in which the intervals of time follow upon each other any influence on the amount of the equiva-

†See continuation in next week's issue.

lent demand. So far it has been assumed that the load curve of the central station is of such nature that it starts with the peak load and that the load curve of the central station is steadily falling from the left to the right. This, however, is an assumption which in practice will hardly ever be fulfilled. The load curves go up and down in an irregular manner and have one or more peaks and valleys (maxima and minima).

We might now just as well have had the time intervals of Fig. F arranged in any other order than what Fig. F shows without causing any change thereby in the amount of the equivalent demand, as long as the demands themselves are not changed. For instance, the time intervals might be arranged so that the staggered duct of lines first rises and then, after reaching a maximum h_1, falls again or they might be arranged to form several peaks and valleys in the central-station duct of lines. The resulting equivalent demand will not be changed by this, because it is not essential that, for instance, the interval with the central-station load h_2 is to the right of the interval with load h_1 (Fig. F) nor that it immediately adjoins it. We can follow exactly the same line of reasoning and come to the same conclusions if this is not so. But it is more convenient to have the intervals arranged in the order of the magnitude of their respective central-station load, especially where the load curve is no longer a duct of horizontal straight lines but a steadily curved line, in other words, where we have an infinitely large number of infinitesimally small time intervals.

The first problem to be solved in a practical case is, therefore, the transformation of the load curve of the central station into another curve by a transposition of the time elements so that the latter are arranged in the order of the corresponding central-station loads, beginning with the highest load (peak load) at the extreme left and ending with the lowest. Designating the original central-station load curve as curve B (Fig. 1†), we will by this rearrangement transform the B curve into a curve corresponding to the duct of lines with the ordinates h_1, h_2, ... (Fig. F). The

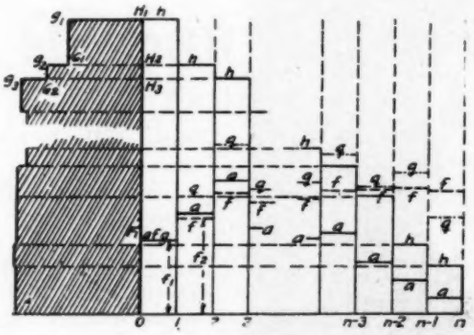


Fig. G.

resulting curve will for that reason be designated as the h-curve. It will steadily fall from the left to the right, or at least rise nowhere to the right.

This transformation of curve B will also result in a transformation of curve b, that is, of the load curve of the individual consumer whose equivalent demand we wish to determine. Every moment of time—to whichever position it has been shifted—must always remain connected, not only with the same central-station load which it had originally as per curve B, but also with the same load of the individual customer as given by curve b.

The customer's load curve thus changes into another curve to be called curve "a" hereafter because it corresponds to the shaded part of Fig. F, that is, to the aggregate of the load curves of all consumers A.

From "h" and "a" the curves "q," "f" and "g" will be found successively, the meanings of which have been explained before. Finally, by transforming the area under curve "g" into a rectangle the equivalent demand of the customer with the load curve "b" is obtained as the height (or rather width) of that rectangle in the horizontal direction.

These operations, although not very simple, still are not as intricate as it may appear at first sight and they are made in less time than it takes to describe them. The construction of the various curves will be described in the continuation of Insert VI in the next issue.

†To appear in the next issue.

(To be continued.)

REPORT ON GOVERNMENT WIRELESS TELEGRAPH STATIONS.

Extracts from Census Bureau's Report on Telegraph Systems of the United States in 1917.

The United States Bureau of Census has issued a report on the telegraph systems of the country during the year 1917 and the five-year period 1912-1917. Extracts from that report were published in our last issue. The following data, also from this report, deal with the Government's radio stations.

The Government has erected wireless plants at various points along the Atlantic and Pacific coasts and at Pearl Harbor, Hawaii, and Cavite, in the Philippines. The Government shore stations, according to the reports of the Bureau of Navigation numbered 135 on June 30, 1918, of which 88 were in continental United States, 20 in Alaska, 19 in the Philippine Islands, 3 in the Canal Zone, 2 in Hawaii, and 1 each in Porto Rico, Guam, and Samoa. The Government ship stations totaled 470.

The station at Arlington, Va., has been in regular communication with the station at Chollas Heights, near San Diego, Cal., since May 1, 1917. Direct communication with an Italian Government station in Rome was also established. On Sept. 29, 1917, radio communication was established between Arlington and Pearl Harbor, Hawaii, via Sayville, N. Y. Messages are now transmitted between Arlington and the Philippines through San Diego, Cal., and Pearl Harbor, Hawaii. Under favorable conditions, at night, the Arlington station can communicate directly with the Pearl Harbor station, but the usual practice is to relay through San Diego.

IMPORTANCE OF CO-ORDINATING POWER SUPPLY RECOGNIZED IN ENGLAND.

One of the matters given much attention at the recent convention of the Incorporated Municipal Electrical Association of Great Britain was the proposed interconnection and rehabilitation of that country's power supply systems, which was referred to at length by President Frank Ayton.

In Mr. Ayton's opinion, the need for the reorganization and the co-ordination of electric supply had been abundantly proved. The electric supply industry was now, as it were, part and parcel of the manufacturing organization of the country; its future and its prosperity were indissolvably linked up with that of the nation's industries. Electric power, cheap and abundant, was clearly one of the main necessities for export trade.

PENNSYLVANIA ASSOCIATION PLANNING IMPORTANT CONVENTION.

The annual convention of the Pennsylvania Electric Association, which is a geographic section of the National Electric Light Association, will be held at the Bedford Springs Hotel, Bedford Springs, Pa., on Sept. 3 to 6, inclusive. Although no definite features of the technical program can as yet be announced, it may be safely stated that the convention will be along the lines of those that were so successfully conducted and so largely attended before our entry into the war. An exhibit by manufacturers of electrical equipment is to be held as an important feature of the meeting. H. M. Stine, 211 Locust street, Harrisburg, Pa., is secretary of the association.

Complete Electrical Equipment for the Home

Paper Read Before National Association of Electrical Contractors and Dealers Describing Plan to Popularize Use of Convenience Outlets

By JOHN G. LEARNED

Chairman, Commercial Section, National Electric Light Association.

THERE exists a community of interest among electrical manufacturers, jobbers, dealers, contractors and central stations in the fostering of the complete electrical equipment of the home. Therefore, the plan of the National Electric Light Association, Commercial Section, to bring about a nation-wide educational campaign for the purpose of creating a greater demand for complete installations of wiring and appliances in the home should meet with favorable consideration.

Although the electrical industry has made most remarkable strides in the last 25 years we have been woefully deficient in focusing our efforts on educating the public to the unit idea of electrical equipment in the home. Electric lighting installations are fairly well handled, although there is vast room for improvement, whereas the necessity of an adequate number of outlets for the use of portable and electrical appliances has been sadly neglected by comparison. The future permanent success of the "Residence Service" of our business depends largely on our ability to so thoroughly educate the public that the layman and laywoman will be as conversant with the complete unit electrical equipment of the home as they are now with the electric starter, the electric headlight, the electric horn and the other refinements of the automobile. There never was a more opportune time than now, especially on account of the present shortage of household help.

John G. Learned.

Assistant to the Vice-President, Public Service Company of Northern Illinois.

The Commercial Section of the N. E. L. A. plans to get the manufacturers of electrical heating appliances, washing machines, vacuum cleaners, portable lamps, fans, vibrators, hair dryers, sewing machines, etc., accessories and other appurtenances used in the home, to include in their national advertising an illustration of the baseboard or wainscoting receptacle. The idea being to show the particular appliance advertised and the cord connecting it to a receptacle, which can be done without any additional expense. Those manufacturers who have had this matter brought to their attention are very enthusiastic and have already taken steps to co-operate.

Central-station companies are having this matter brought to their attention and are being urged to feature appliance outlets along the same lines in local newspaper advertising, on billboards, customer's bills, and salesroom advertising. Department stores will be urged to follow suit. Jobbers, dealers and contractors should also get behind this campaign, which is not for a week or a month, but continually. The results will be accumulative.

Another method of bringing the message home is to make up window displays of appliances with their cords connected to receptacles mounted on sections of baseboard or wainscoting.

Coffee dealers, packers and other manufacturers will be asked to use electrical appliance illustrations showing the cord attached to a receptacle in their national advertising, instead of the alcohol appliance now used. Special attractive advertising in pamphlet form on this subject—receptacles—will be prepared for distribution to architects by the central stations.

Below is quoted the advertising manager for a well-known electrical manufacturer who is particularly enthusiastic on the subject:

One way to increase the interest and therefore the installation of more adequate provisions for use of electrical appliances in the home is to form a small committee to outline a complete campaign to cover a given period of months. Some of the things to be done are as follows:

1.—Prepare cuts of several sizes and kinds to be furnished to all manufacturers of electrical goods and to have these cuts used similarly to the Liberty Bond and War Savings Stamp cuts in advertisements over the period selected. These cuts will therefore act as constant reminders to all of us in the electrical industry and those cuts used in the national media by the various manufacturers who advertise in such publications will help to bring home this campaign to the public in general. These cuts can also be used in the various folders, literature and on letter-heads, during this same period regardless of what the folders or other literature describe.

2.—Special Folders and Other Printed Matter.—Folders and other small pieces of printed matter to be prepared especially on this subject of the advantages of more adequate equipment for the use of electrical appliances, and this material used as envelope stuffers by lighting companies, manufacturers and their district offices, engineers, electrical jobbers and electrical contractors and dealers. A good portion of these stuffers would therefore reach the hands of the public also.

3.—Small Stickers for Letterheads.—A series of these could be prepared, covering the subject which could be used over a period specified in the campaign by the same groups mentioned above. Many of these, in this way, would come to the eyes of those interested in building.

4.—Manufacturers making such devices which would be used in installing adequate equipment in the home would be urged to extend their advertising and concentrate on devices such as receptacles, etc., during the period decided upon for this campaign. These same manufacturers will furnish to the dealers, contractors and lighting companies small electros and other suggestions, advertisements and folders, which could be used for local and newspaper advertising by these concerns.

The Safest Soap
for your Washing Machine.
is
KIRK'S
AMERICAN FAMILY
SOAP
The time and labor that your fine washing machine will save you, will count for little if your clothes come out injured and bleached white, because of the soap you have been induced to use, that contains bleaching alkalies and other impurities.
There is nothing in American Family Soap that will injure, spot or discolor the most delicate fabrics, and in warm or cold water it quickly washes the clothes lily white, clean and leaves them sweet smelling. Its purity has made it the favorite laundry soap for over three generations.
JAMES S. KIRK & CO.
Chicago
Cheaper to Buy Good Soap Than New Clothes
American Family
James S. Kirk & Company

Recent Advertisement showing how other industries apply electrical idea to their advertising. In accordance with the new plan such advertisements will show the washing machine connected to a convenience outlet.

5.—Little stories, articles, and illustrations could be prepared for the various electrical journals as well as some specially prepared for the general publications and particularly for *Good Housekeeping, The Woman's Home Companion, The Ladies Home Journal, House and Garden, Woman's Magazine, Today's Housewife, Delineator,* etc.

Undoubtedly the persons preparing these articles for such magazines will co-operate and have the need for adequate outlet equipment emphasized in these articles and, possibly, have at least one article devoted just to that one subject alone.

6.—Electric lighting companies during this period could also be instructed to attach slips to the electric lighting bills, such slips to carry a message concerning the convenience of more adequate wiring of the home.

7.—At the same time, the architects and electrical contractors figuring on wiring jobs should be urged to bring the matter of convenient outlets to the builders' attention, since a good many people still are not familiar enough with electrical work to appreciate the wonderful convenience of having many outlets, as for instance, in the baseboard and do not realize that the addition to these outlets does not mean very much greater cost when figured over a period of say five to ten years.

8.—Short Movie Films and Slides.—There are a number of companies prepared to make up movie films which are produced in such a satisfactory manner that the moving picture houses throughout the country are glad to make use of them in connection with their usual programs. In such films, a very forceful appeal can be made and the convenience of many outlets can be played up in a pleasant though distinct manner and the disadvantage of a poorly equipped home emphasized. The mind of the theatre goer is in a particularly receptive state when looking at the screen and such films in connection with other slides advertising the installation of various receptacles by local contractors and lighting companies will tie up very strongly with the other promotion work.

9.—The subject matter for advertisements might play up the saving in wear on electrical fixtures; the great convenience of electrical appliances made still greater by the provision of adequate outlets or attaching places for the ready connection of electrical appliances in various rooms, to electrical circuits. Safety could be emphasized also.

10.—Various little stickers for use on letter-heads might have subjects similar to the following:

When Wiring Your Home Have Outlets Arranged for Your Electrical Appliances.

Double Electrical Conveniences—Have Extra Outlets for Electrical Appliances.

Save the Wear on Electric Fixtures—Connect Your Electrical Appliances to Baseboard Outlets.

Have Extra Outlets in Your Laundry as Well as in Your Living Rooms for Your Electrical Appliances.

Electricity Is Your Servant—Have Outlets Installed for Your Electrical Appliances.

In Wiring Old Houses Install Well-located Electrical Outlets Generously.

Provide Complete Electrical Installations in New Houses—Especially Outlets for Appliances and Lamps.

Numerous Faucets Are Provided in the Home for the Convenient Use of Water. Why Not More Outlets for the Use of Electrical Appliances and Lamps?

More Outlets for More Business.

More Electrical Outlets—More Satisfied Customers.

Extend Electric Service by Installing More Outlets.

Don't Rob Peter to Pay Paul.
Install more outlets for the simultaneous use of Electrical Appliances as well as Electric Lighting.

The Modern Home Uses Electric Service.
Extra outlets in each room for the convenient use of Electric Appliances
Solve the servant problem.

For Quick Convenient Use of the Electric Heating Pad Provide an Extra Outlet in Your Bed-room.

In Nearly Every House Now-a-days Some Provision is Made for the Use of Electricity, but Very Often too Few Outlets Are Installed for the Convenient Use of Electrical Appliances and Portable Lamps.

To Rectify Such Omission After the House Is Built Is Expensive.

MORAL: Make your Electrical installations complete at first. Install extra outlets in every room.

Electricity Will Increase the Value of Your Property Many Times Over the Small Cost of the Investment. Be Sure Your Installation Is Complete. Install One or More Extra Outlets in Every Room for the Use of Electrical Appliances and Portable Lamps.

These ideas are formed only in part but they can serve as a starting point and could be developed into a more complete form and augmented after a little conference on the subject. With any kind of work it is easier to have some actual start than to just talk the matter over.

In addition the following are some ideas intended to suggest slogans and text matter which might be further developed for use in support of a campaign for more electrical outlets.

Let out Pent-up Electric Service by Installing More Outlets.

Electrical Outlets Increase House Values
Provide one or more extra outlets in the floor, baseboard or wall in every room for the convenient use of
Electrical Appliances and Portable Lamps.

Modernize Your Home
with extra outlets for the use of
Electrical Appliances.

Take Full Advantage of Electric Service
Install extra outlets in every room for the use of Time and Labor-Saving Devices—
Electrical Appliances.

Extra Outlets for Electric Portable Lamps
—for Utility and Beauty.

Extra Outlets Promote Sale and Use of Electrical Appliances and Lamps.

Insufficiency of Outlets Restricts Use of Electric Service

Increase sales of Electrical Appliances and Lamps. Install one or more outlets in every room of every home.

Mr. Business Man—You use several telephones in your office for good business reasons; also for convenience. How about your Home? Extra Outlets in each room permits the convenient use of time and labor-saving devices—
Electrical Appliances

Give a thought to the wife. Install more electrical outlets. For Comfort, Convenience and Economy Install Extra Outlets for Electrical Appliances and Portable Lamps.

Do a Good Job While You Are About It.
Don't Skimp on Electrical Outlets.

An Extra Outlet or Two Installed on the Porch Will Be Found Useful for Attaching the Electric Fan or Portable Lamp.

Install Outlets in the Halls for Use of the Electric Vacuum Cleaner.

The Completely Electrified Home Will Remain Modern for Years to Come. Install Plenty of Outlets.

In conclusion, what has been stated only skeletonizes some of the ways of doing that which we have in mind. It remains for the contractor-dealer to get behind this movement, as it is self evident that although the central stations are the principal beneficiaries, it is to the mutual advantage of every one engaged in the industry. It follows as a matter of course that if this work is taken up in a big way as outlined that the public will be educated to the necessary degree, with the result that a big demand will be created for wiring, receptacles and appliances.

And, as a result, the contractor will do more wiring, the dealers will sell more appliances, the jobber will do more business, the manufacturers will turn out a larger volume of products, the central station will enjoy more revenue, and last, but not least, the consumer will enjoy complete "Residence Service."

JAPANESE COMPETITION IN ELECTRIC CABLES DECLARED TO BE FAIR.

A Japanese Electrical Engineer Connected with General Electric Co. Denies Statements of Our British Correspondent.

To the Editor:

In the June 28, 1919, issue of the ELECTRICAL REVIEW there was made public an article entitled "Japanese Competition in Electric Cables," which aroused my keen interest or rather regret because of the misleading information quoted in it.

It is true that little inroads were made by Japanese cable manufacturing concerns during the past two or three years into the British trade connection with India and the British colonies, but it is utterly false that Japanese workpeople receive 12 cents per day of 12 working hours or 1 cent per hour. No page of Japan's labor history gives any record of such a cheap payment. The average wage at present is, roughly, $1 per day of 9 working hours.

That article further says that the Japanese copied the British labels as well as the British cables. Although I am not connected with any Japanese cable manufacturer economically, this remark could never be passed lightly over because it is an insult to our national fame. Electric cables exported to British oriental colonies were solely manufactured by the Yokohama Electric Wire Works, which is located in Yokohama, Japan, and that company has never used an inspection "C. M. A.," the mark of the British Cable Makers' Association, with the little word "not" which might easily be overlooked, as described in your magazine.

Schenectady, N. Y., July 15, 1919.

F. OHASHI.

GOVERNMENT OF CHILE APPOINTS HYDROELECTRIC COMMISSION.

According to recent press notices the Government of Chile has created a commission to study the hydroelectric possibilities of that country with a view to developing its natural water-power resources for this purpose. It is the intention to construct a series of hydroelectric power stations which will be tied together through an extensive longtiudinal system. In this way the electric power derived from the waterfalls will be made available over a long stretch of territory.

This country is particularly well adapted to such development for many of its vast water-power resources are but a short distance from its larger cities and industries and there is also a considerable demand for power for mining purposes. In addition, coal and other forms of fuel are comparatively scarce and expensive.

A Perspective Glance at the Future of American Business

Calm Survey of Conditions in Europe and the United States—Unfortunate Letting Down of Production Here —Need Is to Increase Effort Rather than the Reverse

By CHARLES G. DU BOIS

President, Western Electric Co., Inc.

EVIDENCES are plentiful that a considerable portion of the American public does not recognize the opportunities and responsibilities before it in the industrial and commercial field. Leaders in American business feel that the country must be aroused on this matter. One of the clearest statements on this topic yet presented is the one by Mr. Du Bois published herewith. The points he makes should be carefully and thoughtfully considered by not only electrical men, but by those in other industries, and by labor as well as by capital.

THE Great War is ended and the day of reckoning has come. The victorious allies rightfully hold the criminal German rulers to account for their crimes and the German nation to make reparation up to the limit of its ability. But even while we continue to rejoice in this victory, we should be seeking to see as clearly as we can, and in its true perspective, the economic situation that is immediately before us. It is not a problem to be worked out only by a few statesmen, assisted by experts. We all need to understand it because we shall all have a part in it and its solution is fraught with incalculable importance to ourselves and the generations that are to follow us.

At the risk of attempting too much, let us consider in their relations to each other the main features of the present economic and social situation as they bear on our own material prosperity.

By reason of the much longer and greater strain on the European nations during the war, they are in a far more disorganized condition now than America and they are thus unable to proceed as rapidly with the conversion of war activities into normal peace activities. Europe needs our products and, until its own industries are completely re-established, we must take our pay, not in money or goods, but in securities—that is, promises to pay at some future date. From a purely selfish standpoint, America as a creditor nation wants other nations to prosper so they can buy our goods, can pay the interest on their debts to us, and can eventually liquidate the principal.

And as to our domestic situation, we have to remember that our war activities created employment for everyone, and to that extent made for generally prosperous conditions. It remains to be seen to what extent such prosperity was merely temporary. Even while it lasted, some of it was more apparent than real. Wages increased as the cost of living went up and the cost of living in turn increased as the wages that constitute most of the cost of every article went up. This process, as everyone knows, can create no prosperity for us as a whole, for though it has affected many individuals favorably, many others have been compelled to seriously curtail.

During the war there undoubtedly was a greater prosperity than normal, but it had another cause. This was that everybody worked and everybody, whether voluntarily or by compulsion, saved. Since we worked harder, we produced more than ever before, while at the same time we consumed less and wasted much less. This greater net production aided considerably toward paying our war cost but still it left an enormous amount—judged by pre-war standards—to be paid in the future.

We are only now really facing this future. The great joy and relief we all felt when the armistice was signed last November and we knew that at last all fear of German world domination was over, has been followed in the succeeding months, as was only natural, by a letting down of effort which, though it may be small in each individual, has been and is, in the aggregate, stupendous.

That part of the war production which was at the cost of undue strain and fatigue is, of course, no longer necessary or justifiable, but, making full allowance for this, the present let down of effort from the war standard represents a serious loss in production.

Moreover, this material loss is accompanied by a mental unrest that threatens even more serious consequences. The relief from the emotional strain of war affects us all. Some realize soberly the difficulties that must be surmounted and appreciate that the only practical course of action is to work steadily ahead under the existing conditions. Others, who are less practical or whose minds have been inflamed by visionary ideas or strained perhaps by personal misfortune, think they see the dawn of a millennium and demand swift and radical economic changes in the unreasoning hope that somehow a great betterment will result.

The desperate conditions in eastern Europe have produced the most violent reactions. Where society has become so disorganized that the ordinary methods of production, distribution and trade have broken down, idleness results from the disorganization, and hunger inevitably follows idleness. To starving men, anything seems better than starvation, so bolshevism, which promises everything and by criminality gets something for a while, seizes its opportunity.

All this is like jumping off the precipice because the road is rough. Civilization itself depends on the

maintenance of law and order. Without them the world would quickly fall into chaos, so that governments only fulfill their primary function by dealing swiftly and sternly with all attempts to overthrow by force this fundamental principle. This must be so, whatever sympathy may be felt for those whose misfortunes or weak judgment have made them the dupes or tools of criminal fanatics.

The conditions in America are so much better than in any of the war-stricken countries, are indeed so prosperous, that we need not really fear any large movement here toward any form of anarchy. But the great safeguard against it is to preserve our present prosperity till the strain in Europe has passed.

It is idle to suppose that material prosperity can be maintained except by continuous production; in fact, the extent by which we can intelligently increase production measures the increasing volume of prosperity.

The modern organization of industry by which goods are designed, produced, sold and transported has undoubtedly been the foundation of a material prosperity, such as was never before conceived. It has its imperfections, as have all human affairs, but it has, in a democracy at least, the means of self-correction, it has greatly stimulated invention and scientific research, and above all, it does operate the machinery of production and distribution so that men have food, clothing and shelter and a chance to improve their condition. This machinery has just successfully stood the unprecedented strain of war demand for production. The real problem before us is to keep it in adjustment under the less spectacular conditions of peace. And yet perhaps these conditions rightly considered are no less inspiring.

For we look not only to helping Europe and so safeguarding ourselves but, by the means of material prosperity, we think of a better America than we knew before the war. And that better America to deserve the name, must mean better working and living conditions, so that all who are willing to work may have continuous opportunity to do so and may participate fully and fairly in the product of their labor. We want better cities, better homes, better schools, better rural conditions. But we know such betterments can only come by greater efforts than we have yet made.

The achievement of all these objects seems clearly possible if we can get a clear perspective of the situation so that we see all its parts in their true relations to each other and as together making one complete picture. If we can get that perspective, we shall see what our course of action ought to be.

Does it not point directly toward increasing just so far as we can the total production of the country? Rather than a lessening of effort, is it not the time to increase our effort, both for quantity and quality? Shall not such effort be toward wresting from nature more of her secrets, and by applying to them the work of our brains and our hands get a future yield which will make that of the past look meager? Or shall we be content with the total of what we have had and spend the rest of our strength in quarreling over its division? The one way is full of inspiration and promise, not only for a better America but for a better world. The other is both toilsome and unfruitful and only seems easy because we are used to it.

Can there be any doubt that America, in this hour of her opportunity for economic leadership, as well as moral leadership of the world, will choose what seems the harder but viewed in the whole perspective is both the easier and the greater course?

ELECTROCHEMISTRY IN ITS HUMAN RELATIONS.

Timely Extracts from Presidential Address Before Last Meeting of American Electrochemical Society.

By F. S. Tone.

We are human beings as well as electrochemists, and we may well study the relations of our science to the world problems of today and how we can give most immediate and most effective service for the betterment of human society.

For four years we have been in the thraldom of a great war. We have been passing through a period of violent evolution, the nature and extent of which we have hardly begun to measure or realize. Science and industry and, in fact, every human activity emerges from this world turmoil with new and rapidly shifting viewpoints and new responsibilities, and electrochemistry forms no exception. It is therefore profitable at this time to take some survey of our present situation and to forecast our future activities and responsibilities in the new alinement of human relationships. If a new era has begun, what is our part in it?

As one of the big results of the war, new and better conditions of living are demanded by the masses of the people in all countries. If a higher plane of living in the matter of food, clothing, housing, fuel and sanitation is to be established, and if shorter hours of labor and more opportunity for recreation and self-improvement are to be the order of the new day, this can only be brought about by vastly increasing the production of all the essentials which enter into the needs of modern society. Not forgetting such factors as co-operation, efficiency of organization and distribution and elimination of wastes, production can be increased principally in two ways: First, by using labor more efficiently, and second, by further supplementing and supplanting labor by the chemical and mechanical instrumentalities of industry. Either we must get more out of labor or we must stimulate the discoveries that will make labor more productive than before. If the world is going to work less, science must work more. The work of the world cannot be done in a 6-hour day and 32-hour week unless applied science gets in a lot of time-and-a-half on weekdays and double time on Sundays.

Food and Fertilizer.

Among the problems of first importance is that of the world's food supply. The crop yields of the world must be vastly increased, and this in the face of a decreasing labor supply. If cereals, cotton and animal fodder must be produced in greater quantity and more cheaply, the answer can only be found in improved transportation and traction for the farmer and in a vastly extended use of fertilizer, and here rests a big problem with the electrochemist. Judged by European standards, the American farmer is inefficient. He produces 14 bushels of wheat to the acre while in Europe the same acre yields 30. European yields all along the line average from 50 to 100% greater than American yields, and while this increase is in part due to intensive farming, better selection of seed, and crop rotation, the big difference is in the enormously greater use of fertilizer. It is of the highest economic importance that the American farmer shall use more fertilizer.

The three main elements of plant food are nitrogen, potash and phosphoric acid, and each one of these

carries a problem for the electrochemist. The fixation of nitrogen is one of the great triumphs of electrochemistry, and the possible exhaustion of the natural nitrate fields is to us no longer a matter of any anxiety. So long as we have energy and air the land need never want for ammonia. Still the efficiency of the arc process of fixing nitrogen is today less than 5%, and between this figure and the best efficiency attainable, there is certainly breathing space for the most energetic of our research workers. The extension of the cyanamid process has been one of the remarkable chemical events of the war. Its opportunity for peacetime accomplishment is no less, but we still have some distance to go before artificial nitrates can be laid down to the farmer in such quantity and at such price as will mean the doubling of our crop yield.

The potash problem during the war has been brought into the field of electrochemistry. The Cottrell system of electrostatic precipitation has been successfully applied to gases from blast furnaces and cement plants, and if the waste gases from all such plants were treated by the Cottrell process, the possible recovery of potash would be equal to our pre-war consumption. We can hardly hope that this is commercially possible, but in many localities it will give a permanent source of potash which will maintain its existence under competitive conditions. What the electric furnace can do in phosphoric acid recovery is not so well proved. But passing over this, we see that the solution of our national food problem is one in which, despite our past accomplishments, we still have large responsibilities.

Sanitation Through Use of Chlorine.

In the new order of things we are going to banish the slums and have more healthful living conditions, and the role of the electrochemist in sanitation is told in the story of chlorine. We learn that when the armistice was signed we were just ready to deliver each day to our fighting forces on the western front over 200 tons of poison gas. The basis of this great offensive weapon was chlorine, and it was denied its opportunity to demonstrate in a big way what it could do to win the war against the Huns, but I believe it has a far greater opportunity in the germ warfare of peace times.

In starting to investigate the work that chlorine is doing in sanitation, I knew in a general way that it was of growing importance in the purification of drinking water, but upon assembling all the data it was astounding to find that chlorine is today making safe the drinking water of more than 20,000,000 people of this country who dwell in cities. Chlorine is safeguarding one-fifth of our population from typhoid. We learn that a military force or an industrial expedition can go anywhere in the tropics and be at all times assured of potable water if it carries a few pounds of hypochlorite. In the Carrel-Dakin solution for the treatment of wounds, the use of chlorine is defined by a recent authority as the greatest discovery of surgery in the whole war. During the recent epidemic of influenza, the number of cases in the cell rooms of two electrolytic chlorine plants, located in different states, was one-half of that in any other portion of the plants. Starting with a few such facts as these, what more is needed to build up a great structure of organized sanitation with chlorine as its basis? We are looking for an outlet today for a huge producing capacity brought about by the demands of the war. Do not these examples of what chlorine is doing in germ warfare clearly point the way?

The sterilization of sewage is as logical a measure of sanitation as the sterilization of drinking water. To be sure, no city drinks its own sewage, but some other city generally does. Why permit Chicago and Milwaukee, Detroit and Cleveland to pollute the waters of Lake Erie, Lake Ontario and the St. Lawrence Why should Pittsburgh pass its germ-laden water on to Cincinnati and Louisville when an adequate remedy is available at reasonable cost? One hundred and twenty pounds of hypochlorite will sterilize 1,000,000 gallons of screened sewage. A city of 1,000,000 inhabitants can sterilize its sewage at a cost for its chemicals of $360 per day. The cost per single inhabitant for one year would be about 12 cents. But the work of chlorine does not stop with water supply and sewage. It should be used to flush and sprinkle our streets, to clean our cars and public buildings, and to sterilize our dairies. The organized use of chlorine in sanitary milk production will do more to give our children a pure milk supply than any possible system of inspection.

We are searching for an outlet for our excess chlorine in metallurgy and in organic chemicals. If our electrolytic chlorine friends would begin telling people how they can live in a prophylactic environment, how they can feed their babies pure milk, and how they can avoid poisoning their neighbors who live lower down on the same watershed, conditions in the chlorine market would soon be such that they would no longer worry about what the Government is going to do with Edgewood.

Electric Steel and Alloy Steels.

Again, in the metallurgy of steel, if electrochemistry has made great contributions to the art, its responsibilities are no less clearly defined. No one now doubts that we shall soon attain to the super-steel, and it is no less clearly indicated that this will be accomplished by the electric steel furnace and electrically produced alloys. The triplex process using the electric furnace as the third step for the refining operation produces a steel of crucible quality at a cost of a few dollars a ton more than open-hearth steel. When it is understood that such steel produces rails which do not break and plates which do not fracture, it will require no advertising campaign in the popular weeklies to bring this product into universal use: public opinion will demand it. The alloy steels have made possible the modern automobile, the airplane engine and the farm-tractor motor. Alloy steels have been a luxury. They have been used only in the vital parts of the mechanism where enormous strains must be met with a minimum weight of material, but their use must be extended. High quality is not incompatible with tonnage. It is the work of the electrochemist to make possible their use as common materials of engineering, thus contributing vastly to improvements in transportation and the mechanical arts. No one needs to have pointed out what this signifies as an economic gain in modern life.

But the field of alloy steels has by no means been fully exploited. The results which the steel maker has achieved with tungsten, molybdenum, chromium and vanadium, marvelous as they are, by no means mark the limit of the art. We now seem to be on the eve of still more important advances based on the use of new alloys, including ferro-uranium and ferro-zirconium. We hear whispers about a zirconium steel of 300,000 lb. tensile strength and 30% elongation. Not being a steel-maker and having no metallurgical reputation to lose, I may venture in my imagination

to build an ocean liner or a freight train of this super-steel in which the dead weight is cut in half and the carrying capacity is increased 25%; or, I may visualize the super-steel bridge and finally the super-steel Pullman car, but in the latter case we are not so anxious to reduce the weight of the car and save steel. Rather we will make the super-steel Pullman four times as strong with the same weight of steel and then sleep soundly in the rear section of the rear car while the second section of the train follows one short block behind. Briefly stated, the job of the electrometallurgist is to put super-steel on a big tonnage basis.

Coal and Water-Power Resources.

Let us now consider our energy resources. These are fuel and water power, and their proper utilization will not only reduce the sum total of human toil necessary to run our industrial machine, but will be a measure of vital importance to coming generations. Our energy resources are necessary to the functioning of every other resource. They are at the very basis of industrialism, transportation and domestic well-being. Thus they concern society broadly, but they peculiarly concern the electrochemist because cheap electric power is a basic element in electrochemical production. The electrochemist was responsible for the success of the world's first great hydroelectric development, at Niagara, and became the natural champion of the utilization of our water-power resources. But why have we failed to sell this proposition to the man in the street and to those whom in his wisdom he has chosen to legislate for him? There may be many reasons for public indifference to coal economics and the waste of water power, but the fact remains that we have as yet failed to state the simple facts and principles of our energy economics in a way which carries conviction to the people with whom responsibility for action lies. Here are some of them:

1. Coal is our greatest energy resource. It is irreplaceable and, notwithstanding an apparent popular belief to the contrary, it is not inexhaustible. The amount available for present and future generations is known to be very definitely limited. The curve of consumption is rising regularly and rapidly, and we can compute with a fair degree of accuracy when our magnificent coal reserves will be exhausted.

2. Coal is wastefully mined, wastefully transported and wastefully utilized. If the bituminous coal used for domestic heating alone was first converted into artificial anthracite and the by-products recovered, it would represent a saving of more than twice our entire output of gold for 1917. If our railroads were electrified and fed from central stations recovering the by-products from the coal, this saving would be doubled.

3. Fuel and water power are practically interchangeable in industrial economics. The failure to use water power is just as truly a waste as would be the burning of our coal mines and oil wells. If Congress were to enact legislation to set the torch to one-third of all of our coal that was mined in the country last year, it would be no greater act of folly or crime than to obstruct water-power development. The utilization of water-power resources will save coal and oil for future generations and release for other useful work in the present generation hundreds of thousands of miners, vast transportation facilities and thousands of railway workers.

Having convinced the people that water power must be developed, the most difficult part of the problem remains to be solved, which is to arrive at a form of legislation in which the people and the capitalist believe that their respective interests are protected. Passing over the question of government ownership of water powers, I believe we must all now agree that no legislation for private development stands any chance of enactment which does not carry with it a very much larger measure of public control than would have been acceptable a few years or even a few months ago. Political ideas have changed, and one can plainly observe that public sentiment will not again consent to the development of its water powers as an unrestricted private monopoly. It would not so consent even when awakened to the great economic crime of letting them run to waste. After all, what we want is the power and I believe this Society cannot do less than endorse legislation in which public interests are fully protected by control of rates and proper limitations of charter rights. Following this, we want government surveys covering our complete energy resources and their utilization.

My conclusion shall be brief. It is plain that our science faces some of the big human problems of the day. Our opportunity for service was never greater, and I believe it will not be passed by.

SWISS RAILWAYS EXTEND ELECTRIFICATION OF THEIR LINES.

Further Particulars as to What Has Been and Is Proposed to Be Done.

In our issue of June 28 we published some data on Swiss railway electrification that appeared in a recent publication of the British Board of Trade. The following additional information has been kindly furnished by F. Dossenbach, director of the Official Information Bureau of Switzerland, 241 Fifth avenue, New York City.

The introduction of electric traction on the lines of the Swiss Federal Railways has in these latter years, on account of the acute shortage of coal occasioned by the war, received the foremost attention of the authorities and has now emerged as a very practical economic question.

The principal nerve of the Swiss railway system is Government-owned. Electrification of these lines is simplified by the vast store of unused water power which the country possesses. According to an official survey, verified in 1914, including the stowing and improvement of lakes, the water power of Switzerland is capable of producing an energy equal to 2,173,000 hp. If old plants were replaced by new ones, it is even estimated that the highest capacity of the total water-power reserves could be raised to as much as 8,000,000 hp. On January 1, 1914, the electric power already in use in Switzerland amounted to 887,000 horsepower.

The Swiss Confederation owns some 1800 miles of the entire railway system of the country, which covers 3216 miles. Of the 1416 miles owned by private companies 622 miles are already electrical, but only an insignificant percentage of the Government railroads has so far been operated by electricity.

The first important Federal standard-gauge road to be chosen for electrification was the Gothard Railway, one of the important international highways, and featuring, moreover, in many sections the brilliantly conceived engineering of mountain railways. The electrification of the 68 miles section Erstfeld-Bellinzona was approved in 1913 and it is expected that it will be opened this fall. This section, with

28% of its length consisting of tunnels and a grade of 2.5 to 2.7% for 25 miles, was chosen for an experiment because of its enormous traffic with Italy, which caused large consumption of coal with resulting smoke in the tunnels.

The sections Bellinzona-Chiasso and Erstfeld-Lucerne are expected to follow in 1921 and the consulting experts have found that the big power stations at Amsteg and Ritom, the first yielding 26,000 hp. and the latter 32,000 hp., will also suffice for these lines, even if the traffic should increase some 60 to 70%. Another series of plants yielding 70,000 hp. is planned for eastern and central Switzerland. The cost of electrification of the Erstfeld-Bellinzona line is estimated at $8,000,000. The cost of electrifying the entire Federal railway system is estimated roughly at $200,000,000.

In 1918 the electrification of the following railways using steam traction was decided upon and work on them commenced at once: The sections of the Federal Railroads Sion-Brigue and Berne-Thun; the section Hasle-Langnau of the Emmenthal Railroad and the section Bevers-Filisur of the Rhaetian Railroads. The section Sion-Brigue to be electrified will be a continuation of the electric line through the Simplon tunnel which was opened for traffic in 1906, with its northern exit at Brigue.

The electrified Berne-Thun line, connecting with the electric Berne-Lötschberg-Simplon railway, which latter was inaugurated in 1913, has already been opened for traffic in May last. It now provides excellent and frequent train connections between the Swiss capital, the Bernese Oberland resorts and—in connection with the Lötschberg line—the Valais and Northern Italy.

The new locomotives which are being used by the Swiss Federal Railroads on the section Berne-Thun, besides those of the Berne-Lötschberg-Simplon line, are each equipped with four single-phase alternating-current motors, each of 450 hp. All the electric parts were furnished by Brown, Boveri & Co., of Baden, and the mechanical parts by the Swiss Locomotive & Machine Co. of Winterthur.

Electrification work on the Bevers-Filisur line was completed by middle of last April and from April 16 steam engines have been duly replaced by electric motors, the current being supplied by the power station of Bevers, which furnishes the necessary energy for the Engadine lines that were electrified in 1913.

ALTERNATING-CURRENT EQUIPMENT ON NAVAL AND MARINE VESSELS.

Interesting Elementary Notes on Alternating Currents of Value to Electricians and Officers in the Naval and Marine Services.

Rapid developments in the use of electricity on shipboard have taken place in recent years. Formerly all electrical ship equipment was of the direct-current type and very seldom exceeded 125 volts. Recently the use of alternating-current machinery and apparatus has been introduced on naval vessels, which always have led in the use of electricity for a variety of purposes. In the July number of the United States Naval Institute *Proceedings*, Lieut Commander Lesley B. Anderson, U. S. N., states:

"There is no doubt that alternating currents have come in the navy to stay. At present they are applied to ship propulsion, radio, gyro-compass, submarine signaling, navy-yard light and power, and, on a smaller scale, to gun firing, three-wire generators, testing sets, magnetos, engine-speed indicators, and electric welding. There is such a large field for development that the use of alternating currents will probably be greatly extended within the next few years."

Since relatively very few naval or marine electricians are conversant with the subject of alternating currents, Lieutenant Commander Anderson gives in the article mentioned a simple and very clear outline of the main principles of alternating currents as they apply chiefly to the equipment being introduced for ship propulsion and radiotelegraphy. The article should be read by all interested in up-to-date electrical equipment on shipboard, if they wish to get a good conception of the important apparatus now already employing alternating currents. The notes included in the article were mostly explanations given to midshipmen and reserve officers, both in lectures and talks.

ELECTRIC SUPER-SUBMARINES DESIGNED BY BRITISH ENGINEER.

Designs for a new type of super-submarine have ben elaborated by Capt. Norman Wood, R. A. F., who recently read two papers on the subject before the Institute of Marine Engineers in London. Previous to his connection with the Royal Air Force, Captain Wood was engaged on submarine work and had practical experience of the deficiencies which exist in the design of even the latest vessels. On the surface submarines are driven by Diesel oil engines; under water they are driven by electricity from storage batteries which must be charged when the vessel is on the surface. These conditions are usually met by arranging the following chain: (1) Diesel engine, (2) clutch, (3) electric motor, (4) clutch, (5) propellor shaft. It is not difficult to see that this equipment involves a complex series of operations at critical times as, for instance, when the vessel is caught by an enemy searchlight when the batteries are being charged. Captain Wood proposes to simplify the transition from engine drive to motor drive (or *vice versa*) by adopting an all-electric drive, using, in a 1200-ton boat, two oil engines to drive electric generators supplying current to electric motors used on propellor ships, both naval and mercantile, on the ground that the growth of air power will render submersion the only means of escape from aerial attack. From this standpoint sea power will include air power and submarine power as well as strength in ships of the old type.

FRENCH NEWSPAPER URGES DEVELOPMENT OF WATER-POWER RESOURCES.

The *Echo de Paris* recently stated that the necessity of purchasing foreign coal might be relieved by developing the water power of France, which is estimated at 10,000,000 hp., as compared with 7,000,000 hp. for Norway, and 6,000,000 hp. for Sweden. Before the war only about 750,000 hp. was used, but a further 450,000 hp. was developed during the war, and by the end of 1921, 1,600,000 hp., or 16% of France's resources will be worked. This leaves a huge amount of water power in reserve and, in addition, there are large potential resources in the rivers of Indo-China and French West Africa. One million horsepower would lessen the consumption of coal for power production by at least 3,250,000 tons, costing about 300,000,000 francs, and the comparison is more striking when the greater average efficiency of the hydroelectric installation is considered.

Editorial Comment

Harmony in Conduct of a Meeting

EVERY association that amounts to a "tinker's damn" is bound to be confronted at times with problems over which a decided difference of opinion arises among the membership. On such occasions and by its handling of such problems the true caliber of the organization and the loyalty of its members are really shown. Such a condition arose in the spirited discussion of the labor problem at the Milwaukee convention of the National Association of Electrical Contractors and Dealers, and if any doubt existed prior to that time as to the real worth of this association it can now be dispelled.

It is not our intention to back either side in this issue in these comments as we believe that both sides had the best interests of the association at heart. When the members of any association are concerned in its welfare to the extent shown on this occasion and when the majority finally rules as was the case, there can be no doubt of the association's success.

The most impressive feature of this discussion, however, was the admirable way in which it was conducted and for this Chairman W. Creighton Peet deserves full credit. The position of the presiding officer is indeed a trying one in such situations and Mr. Peet is to be congratulated for the spirit of fair play, harmony and order that prevailed throughout the discussion because of the able manner in which he presided. A less calm and tactful chairman might have allowed such a discussion to get out of hand, leaving serious dissensions to develop that might disrupt an organization.

The Opportunities Before American Business

UNUSUAL opportunities are offered to American business and industrial interests to supply the many wants of war-stricken Europe and incidentally extend the period of recent prosperity. These opportunities have been pointed out by several leaders of industry. One of the most far-sighted views of the situation has been presented by Mr. Charles G. Du Bois, who recently became president of the Western Electric Co.; his clear statement is reproduced in this issue.

He shows that we are in much better physical and economic condition than nearly all other countries. The latter look to us to help them secure food and other much needed supplies. It is our opportunity as well as obligation to do this. But this involves a continuance of the intense industrial application that helped so much to equip and to keep our armies supplied. Recently there has been a relaxation of effort and the spread of industrial unrest, largely imported from bolshevist Russia, has led to countless strikes and other interference with production. What we need is stimulation of production. Idleness very seldom improves the prosperity of a country. The problem before us, therefore, is to redouble our efforts or else fail when the world is looking to us for help.

Similar ideas were also expressed recently by President F. J. Tone of the American Electrochemical Society, part of whose address is printed in this issue. He also emphasized the need for intensified production if the general welfare of the people is to be enhanced. We must make labor apply itself more or we must apply to it scientific and mechanical developments to make it more productive. It is to be hoped that both labor and capital will study the problem in the light of economic and scientific truth and by stimulation of production grasp the opportunities that now present themselves.

Strike Demonstrates Value of Traction Service

CHICAGO has been very seriously hampered and inconvenienced for a period (at the time this is being written) of fully four days this week due to a complete stoppage of all electric street-car lines and elevated railways in the city. When there was every prospect that the negotiations between the employes, the companies and the State Public Utilities Commission would lead to a fair and satisfactory solution of the controversy, the employes of the traction companies called a meeting that apparently was dominated by a small minority which refused to hear the report of the compromise offer and suddenly ordered a strike of all of the employes.

Although the threats of such a strike made during the preceding weeks had led to some efforts to provide emergency service in case the electric lines actually were tied up, the precipitate action of the employes in going on a strike at only a few hours' notice left the public in general entirely unprepared. All sorts of automobiles, motor trucks, buses, taxicabs, horse-drawn vehicles, motor boats, and even some airplanes were pressed into service; among these electric pleasure and commercial vehicles did their due share. The multitude of automobiles, suddenly rushed into the streets, was beyond the capacity of these arteries of travel and very many blockades and accidents resulted. The travel was uncertain, far from comfortable and considerable profiteering was resorted to, many persons being compelled to pay from five to ten times the ordinary street-car fare in order to reach

their places of employment. The steam railroads, through increase of their suburban service, carried a considerable percentage of the persons compelled to travel to and from the central business district. Cross-town travel between outlying districts ceased almost entirely. An extremely large part of the city's two and one-half million inhabitants resorted to the ancient and wearisome method of traveling on foot.

Aside from the inconvenience to those who could not afford to lay off for the period of the strike, the business of the city suffered to the extent of perhaps millions of dollars due to a general slacking up of all work because employes could not reach business houses and factories at the usual hours and to a still greater extent because of the great falling off in business caused by difficulty on the part of purchasers in reaching stores and other places of business. The telephone company came to the rescue in this respect and as soon as it could get sufficient operators to the various exchanges did its utmost to speed up telephonic service. No figures are as yet available as to the enormous excess business carried on over the telephone, which if this means of communication had not been available would have left the city almost prostrate.

The entire city has through this strike again received a very positive demonstration of the extreme value of electric traction service, its low cost in comparison with substitutes therefor, and its indispensability to the business as well as social life of the community.

Responsibility of Utility Employes to the Public

NO EMPLOYE, nor any employer, can afford to ignore the interests of the public upon whose good will depends the success or failure of the business or industry that furnishes his sustenance. This simple truth will be generally accepted by the calm judgment of both workmen and business men. It applies alike to all lines of private business as well as to the quasi-public business commonly called public utility service. To the latter it applies with special force and directness, however, because the general public is so intimately concerned with the character and price of this service, as is shown by its assumption of regulatory control over public utilities.

In the early days of public utilities the importance of accepting responsibility to the public was not generally recognized. The usual attitude, in fact, was the very opposite as was so forcibly but tactlessly shown in the historic remark of a railroad capitalist of the last century—"The public be damned." These ideas ruthlessly carried out in such utility service as was rendered did not take long to stir up most vigorous public resentment. Not only were the utility corporations held in low esteem but they had imposed on them severe legal restrictions, from both of which many have not yet fully recovered. Nowadays, no manager of a public utility would think of committing business suicide by adhering to this obsolete and contemptuous policy.

It is strange, therefore, that this discarded attitude should be taken up by anyone connected with a public utility in any capacity. And yet on Monday evening of this week a meeting of employes of the electric street-car and elevated-railway companies in Chicago was disgraced by a small but vociferous element that drowned out the efforts of the calm and rational speakers by cries of: "To hell with the public." It is believed that this element with its radical or bolshevist ideas represents no more than 10% of the entire employes of these utility companies, yet it dominated the meeting and forced it to suddenly impose a strike on all the electric transportation lines of the city.

Some features of this strike are referred to in another column, and in our last issue we commented on the laudable efforts instituted by the Governor of Illinois to secure a peaceful and equitable solution to the controversy. There was every reason to believe that the compromise offer resulting from these efforts would be looked upon as not only fair, since it introduced better working conditions and wages than prevail in other cities in such service, but that it would be accepted. Yet the radical element referred to prevented deliberate consideration of the matter and brought odium upon all the organized employes by its contemptuous disregard for the interests of the public.

Quite early in this controversy this same element when presenting its extreme demands declared that it cared not where the funds required to meet them would come from, it was no concern of theirs, they knew what they wanted and were determined to have it. It was generally known that the companies were at the ends of their resources and any additional operating expenses would have to be met through increased fares. Moreover, the demands, if granted in full, would have required probably over 50% increase in fares with the inevitable result of greatly diminished traffic.

All these matters it was to be expected should have been given due consideration before the demands were first presented. Various evidences show that the public was little thought of, however. It is not necessary to dwell on other aspects of the case. One thing is certain, however. The strike that was called was entirely unnecessary and its effects will injure the men as much as the companies, if not more. The public has taken the inconveniences and loss due to the strike good naturedly, but it is showing little sympathy with the arbitrary attitude of the men. A very considerable number of passengers have been lost to the traction lines permanently. It is time that the men realize it is folly to kill the goose that lays the golden eggs. Contempt for the interests of the public has never paid to utility capitalists nor will it pay to utility employes.

Current Events

New N. E. L. A. Administration Begins Work—Improving Industrial Relations—Frederick Sargent Passes Away

NEW ADMINISTRATION, N. E. L. A., GETS DOWN TO WORK.

Considerable Activity Shown by Reports Presented at First Meeting of New Executive Committee.

The first meeting of the Executive Committee of the new administration of the National Electric Light Association was held at the association's headquarters, New York City, on July 10. In the absence of President Ballard, Vice-President Martin J. Insull presided.

On motion Everett W. Burdett was re-elected as general counsel. The following committee chairmen were also appointed: Accident Prevention, Charles B. Scott; Company Sections, Frank A. Birch; Constitution and By-Laws, W. C. L. Eglin; Doherty and Billings Prizes, A. S. Loizeaux; Exhibition, C. L. Pierce, Jr.; Finance, Joseph B. McCall; Lamp, Frank W. Smith; Membership, Walter Neumuller; Class C Membership Applications, Walter Neumuller; Public Policy, John A. Britton; Rate Research, Alex Dow; Relations with Educational Institutions, John F. Gilchrist; Safety Rules, W. C. L. Eglin.

A letter from President Ballard was read outlining plans for the year's work, and suggesting the following subjects which might be considered: Electrical resources of the Nation, electrification of steam railroads, rules of regulatory bodies, public information, employes' participation.

In connection with the subject of electrical resources of the Nation, the committee called attention to the fact that both the Department of the Interior and the War Industries Board have compiled considerable data relating to this question and that it might be well to appoint a committee to bring together all of the data and material on the subject collected by different bodies and put them in shape for the central stations to use.

It was announced that the Technical Section had reappointed the Committee on Electrification of Steam Railroads, which was discontinued several years ago, and that Peter Junkersfeld would serve as chairman. Mr. McClelland stated that statistics as to the savings effected by electrified roads should be collected and publicity given to them. It was also suggested that a National Committee might be appointed on this subject to work in conjunction with the Technical Section Committee.

Mr. McClelland advised that the National Industrial Conference Board has been doing a great deal of work on the subject of employes' participation, and that if the Association appoints a committee to study this question it should utilize the data collected by the Board.

President Ballard's letter regarding the year's work also covered the representation of the Association at all Geographic Section and other electrical conventions.

Chairman Moultrop, of the Technical Section, reported that his Executive Committee had held an all-day meeting on July 9, at which time the committees were appointed, the work of each outlined and their meetings scheduled for the next 12 months. In order to enable the western committee members to attend, the meetings will be held as far west as possible, one or two being scheduled for Denver. By the appointment of O. B. Coldwell, of Portland, Ore., as a member of its Executive Committee, the Technical Section now has a representative from both the northwest and the southwest, H. A. Barre, of Los Angeles, also being a member.

Mr. Moultrop reported that in compliance with a request received from R. S. Hale, chairman of the Wiring Committee, he is arranging for technical representation on that committee. He also reported that the Committee on Overhead Lines and Inductive Interference has been divided into two committees, with W. K. Vanderpoel chairman of the Overhead Systems Committee, and A. E. Silver chairman of the Inductive Interference Committee.

At the suggestion of Vice-President Bump, the following committee was appointed to make a report to the Executive Committee at its next meeting on a definite division of the states into Geographic Sections: Chairman R. J. McClelland, H. E. Brandli, J. E. Davidson, L. D. Gibbs, Robert Lindsay, E. W. Lloyd, O. H. Simonds and F. M. Tait.

Acting Secretary Sewall read a report on the work of the Company Sections and the plans of the Company Sections' Committee for the year, which report was prepared by Vice-President Johnson and also the report of the Committee on Managing Director, which stated that the committee considered it necessary that such a director be appointed.

Chairman Symes of the Accounting Section reported that one meeting of his Executive Committee had been held at which time the committees for the year were considered and some of the less active ones discontinued. The Committee on Accounting Relations with Other Associations was merged with the Committee on Classification of Accounts, and the Committee looks for marked progress in the national standard classification of accounts. He also reported that four new committees had been added: Bonus System, Federal Income Tax Return Procedure, Credits and Collections, and Insurance.

For the Commercial Section, Chairman Learned reported activities are well under way and the committees have been appointed, some of which are already functioning. The general plan is to handle the work of the Section as formerly with the addition of the following two new committees: Committee on Relations with Geographic Sections, Company's Sections and State Electric Associations, and Committee on Relations with Contractors, Dealers and Jobbers. It is planned that representatives of this latter committee will attend all state and national meetings of contrac-

tors, dealers and jobbers. This plan has already been put into effect.

For the Electric Vehicle Section, Chairman Foster reported that the Section was considering appointing an advertising man, but that if a publicity man were engaged for the Association this might not be necessary. Mr. Foster stated that as a result of some recent co-operation in Chicago the electric garages have been able to effect considerable saving in insurance premiums and have also been made agents for the insurance companies, thus enjoying commissions on this work. He reported that the Transportation Engineering Committee is now conducting correspondence with 155 colleges in the matter of developing further transportation engineering courses and is compiling a list of electric truck users to which questionnaires are to be mailed to secure operating cost data, etc.

Mr. Foster also spoke of the indifference of central station employees toward the electric vehicle, and said that it was hoped to overcome this feeling by the publication of articles in the Association's *Bulletin* and other ways. He also mentioned the great benefits that might be derived from what he styled a spectacular campaign to introduce electric vehicles, suggesting the possibility of selling them to some city for use in its departments generally, with the particular object of giving wide publicity to such a sale.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Co., San Francisco, a regent of the University of California and one of California's most prominent citizens, has been appointed by President Ballard, chairman of the Public Policy Committee. W. W. Freeman has been appointed vice-chairman.

SPRAGUE SHOP COMMITTEE DECIDES ON THRIFT AMONG EMPLOYES.

General Shop Committee of Sprague Works of General Electric Co. Adopts Thrift Bond Savings System.

An interesting example of the actual working of the "shop committee" in industrial plants was afforded by a meeting of the General Committee of the Sprague Electric Works of General Electric Co. at Bloomfield, N. J. In the organization of the plant there are committees covering each of the various shop activities and the General Committee, which is composed of these subcommittees and consists of about 35 employes.

The meeting was called to consider the question of making thrift among the employes permanent—a subject receiving increasing attention in industry because of the stabilizing effect of thrift on the workers and the big impetus given to thrift by the war which threatens to be lost.

The committee decided unanimously that regular saving makes for the well-being and contentment of the worker. Various methods of saving were discussed, including savings banks, building and loan associations, War Saving Stamps and the Thrift Bond savings system. The committee did not favor methods involving periodical deposit of money or the purchase of securities because of inconvenience, difficulties of withdrawal and irregularity. The committee unanimously decided in favor of "automatic saving" through pay-envelope distribution. This is the principle of the Thrift Bond savings system installed by the National Thrift Bond Corporation, New York City, for the General Electric Co.

In this system the employe signs a subscription form promising to save a certain amount regularly and thrift receipts to that amount are inserted in his pay envelope instead of cash. The saving is thus automatic and requires no further initiative on the part of the worker. Ten dollars' worth of these thrift receipts may be exchanged for a $10 Thrift Bond, which bears interest paid through coupons attached. Ten of these Thrift Bonds may be exchanged for a $100 registered Thrift Bond. Taking up the question of continuous encouragement of the idea among the employes, the committee disapproved of solicitation by volunteers in the works' organization and preferred the work being carried on by paid agents of the banking corporation.

According to the executives, the opinions of the employes' committee were of value, because in such cases best results are obtained by using methods endorsed by the workers.

PROGRAM FOR AMERICAN ELECTROCHEMICAL SOCIETY MEETING.

Fall Meeting to Be at Chicago, Sept. 23-26 and Include Joint Session With American Institute of Mining and Metallurgical Engineers.

The fall meeting of the American Electrochemical Society is to be held at Chicago on the four days, Sept. 23-26. Headquarters will be at the Congress Hotel. The tentative program calls for four joint sessions with the American Institute of Mining and Metallurgical Engineers, which will hold its convention at the same time and place. At present the tentative program is as follows:

Tuesday, Sept. 23: Excursion by boat with American Institute of Mining and Metallurgical Engineers to Gary, Ind., and trip through United States Steel Corp.'s plant. Joint technical session, on the boat, returning from Gary, subject: Electrometallurgy of Iron and Steel. Joint technical session, at Congress Hotel in evening at 8:30 p. m.

Wednesday, Sept. 24: Morning—Session for reading and discussion of papers. Afternoon—Joint Ferrous Metals. Evening—Inspection of the electric furnace exhibits at the Chemical Exposition.

Thursday, Sept. 25: Morning—Symposium of Catalysis. Afternoon—Symposium of Catalysis, continued. Evening—Smoker and entertainment.

Friday, Sept. 26: Morning and afternoon—Joint session; subject: Symposium on Pyrometry.

The secretary of the Society is Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

ACTIVE WORK PLANNED BY OVERHEAD SYSTEMS COMMITTEE, N. E. L. A.

Committee Seeks Co-operation of Member Companies' Engineers and Others in Bringing All Overhead Line Data Up to Date.

The Overhead Systems Committee of the National Electric Light Association, formerly called the Overhead Lines Committee, desires the co-operation of all members and member companies in this year's work of the committee. It plans to bring up to date the descriptions, specifications and other matter previously published relating to overhead line construction. Information will be compiled regarding recent experience and new practices, with especial attention to any

innovations and other features developed during the war period.

To make this work complete, the committee needs active assistance, and it would be much appreciated if members will communicate freely with the committee, furnishing any information which would be useful to the industry. Members are also invited to suggest any features which they think should be developed in the next report. Matter of this kind should be presented in sufficient detail so that the committee can work to the best advantage in securing the desired information.

It is suggested at this time that the previous reports of the committee be reviewed by members in order to determine the character of the recommendations and information still required. If such attention is paid to this subject, the committee's activities will be guided by the real necessities of the industry and there will be a greater production of valuable construction data, without repetition of information already available.

It is hoped the work of the committee will not only be facilitated by these contributions; but that members will avail themselves of this opportunity to make use of their committee by indicating the kind of assistance they desire.

W. K. Vanderpoel, superintendent of the Public Service Corporation, Newark, N. J., is chairman of the Overhead Systems Committee.

MAY ELECTRICAL EXPORTS MAINTAIN HIGH LEVEL.

Monthly Total Only Slightly Below March Record—Eleven-Month Aggregate Is Nearly $70,000,000.

Another high monthly total in electrical exports has been recorded in the figures for last May which have been made public by the Bureau of Foreign and Domestic Commerce, Washington, D. C. The electrical shipments from the United States for that month totaled $7,717,518, or only 2% below the record set last March. The May total was a few thousand higher than that of last April and it was also nearly 54% higher than May of last year.

In the following table are given the detailed figures for last May and the corresponding month of 1918:

Articles.	May 1919.	May 1918.
Batteries	$ 516,001	$ 308,895
Carbons	130,982	112,903
Dynamos or generators	257,908	443,351
Fans	201,125	120,930
Heating and cooking apparatus	146,765	48,492
Insulated wire and cables	838,188	344,186
Interior wiring supplies, including fixtures	179,931	140,050
Lamps—		
Arc	1,300	1,085
Carbon-filament	44,157	10,453
Metal-filament	434,894	308,908
Magnetos, spark plugs, etc.	291,415	160,395
Meters and measuring instruments	245,589	161,431
Motors	817,118	574,437
Rheostats and controllers	64,478	28,516
Switches and accessories	255,099	148,359
Telegraph apparatus, including wireless	70,296	32,339
Telephones	285,785	251,785
Transformers	326,224	214,958
All other	2,610,263	1,601,920
Total	$7,717,518	$5,013,379

The above figures do not include electric locomotives, of which there were exported last May five valued at $37,000. For the first 11 months of the present fiscal year—that is, for the 11-month period ended May 31, 1919—the total electrical exports aggregated $69,698,590, as against $49,527,442 for the corresponding period ended May 31, 1918, and $46,323,381 for the similar period ended May 31, 1917.

GOVERNMENT RETURNS WIRE LINES TO COMPANIES.

Postmaster General Burleson Expresses Satisfaction Over the Manner in Which Government Has Controlled Telephone and Telegraph Facilities.

On order of Postmaster General Burleson government control over telegraph and telephone systems of the country ceased at midnight, July 31. In his statement to the public, Mr. Burleson said he is satisfied with the result of government control, despite widespread public criticism of the telegraph and telephone service for more than a year.

The order of release directed that all telegraph and telephone systems and all property thereof taken over by order of Congress July 16, 1918, be "returned and delivered to the respective owners thereof at midnight on July 31, 1919, and the supervision, possession, control and operation exercised by the postmaster general will cease at that date and hour." The order further directed how outstanding accounts of government operation are to be settled with William H. Lamar, chairman of the Finance Committee of the Wire Control Board, and gave instructions for closing up relations between the Government and the companies.

"With the issuance of Order 3380, providing for the auditing and accounting division," Postmaster General Burleson said, "the first government control of the wire systems of America is brought to an end. Sound public opinion will ultimately demand how this trust has been met, and the Postmaster General is content to abide the result.

"The Postmaster General desires to express to the officers of the telephone and telegraph companies grateful appreciation of the uniform co-operation given during the period of government control."

CHEAPER ELECTRIC WIRING PROPOSED IN ENGLAND.

Committee Formed to Consider Whether Relaxation of Standards Is Justified.

A special committee of the Institution of Electrical Engineers (Great Britain) has been formed to consider the revision of the existing rules for electric wiring in buildings. This committee is the outcome of a growing conviction that the high quality of British cables and accessories justifies a relaxation of the standards hitherto imposed. During the war an enormous number of army buildings have been wired on the surface and in other ways not consistent with standard British practice, and the experience thus gained will be turned to account in cheapening the cost of installation and materials. British manufacturers of wires, switches, insulators and other accessories will thus be led to expand the production of types which will be peculiarly adapted to meet the needs of the overseas markets. Satisfactory quality will be insured by the National Electric Provng House which is about to be established in Great Britain. The Proving House will put the standard of good design, material and workmanship on every class of electrical apparatus, thus giving British productions the full benefit of the high reputation they have always held.

As all attempts made thus far to cheapen wiring in this country have met with disfavor the results of the British committee's investigations will be watched with interest.

FREDERICK SARGENT, PROMINENT POWER ENGINEER, IS DEAD.

Famous Engineering Career in the Design of Large Power Stations Brought to a Close.

Frederick Sargent, senior member of the firm of Sargent & Lundy of Chicago, and probably the most prominent consulting engineer in the United States specializing in the design of electric generating stations, died at his home in Glencoe, Ill., early in the morning of July 26. An Englishman by birth, Mr. Sargent had made numerous trips to his native country and on one of these, made in April and May of this year in company with his close friend, Samuel Insull, president of the Commonwealth Edison Co., Chicago, he was taken seriously ill while abroad. On his return he was removed to a hospital but the doctors were able to do but little for him, and he was taken to his home, where the end came.

Frederick Sargent.

Frederick Sargent was born in Liskeard, Cornwall, England, on Nov. 11, 1859, which is also the exact date of the birth of Samuel Insull, also an Englishman and Chicagoan, with whom Mr. Sargent was destined to be intimately associated during practically all of his engineering activities. His people were of the farming class but young Sargent developed a decided mechanical bent, and eight years of his boyhood and youth were spent in acquiring practical mechanical knowledge and experience in the works of John Elder & Co., the great shipbuilders on the River Clyde, near Glasgow. During this time he gained an extensive and practical knowledge of mechanical engineering, paying particular attention to heavy machinery. The young engineer also improved his education at this time by going to night school at Glasgow University.

Coming to the United States about 1880, the young man found ready employment in eastern shipbuilding yards as a designer of steam engines. He then came west as a designer for the Sioux City Engine Co. of Sioux City, Iowa. A year or so later he accepted a position with E. P. Allis & Co., engine builders of Milwaukee, predecessors of the present Allis-Chalmers Manufacturing Co. Here he attracted the attention of the officers of the Western Edison Light Co., organized in Chicago in 1882 to exploit the electric lighting inventions of Thomas A. Edison in the West, and in the fall of 1884 Mr. Sargent came to Chicago and began his career as an electrical engineer in this city.

Succeeding the Western Edison Light Co., the Chicago Edison Co. was formed in 1887, the first distinctively Edison central-station company in Chicago. Mr. Sargent became its consulting engineer and he has been consulting engineer of that company and its successor, the present Commonwealth Edison Co., ever since.

About 1889 Mr. Sargent went to New York under contract with the Edison United Manufacturing Co. In his position he had general charge of all the work done by that company in the United States and Canada. Shortly after this, the company in New York was reorganized as the Edison General Electric Co., and the subject of this sketch was made assistant chief engineer of the new corporation of which Samuel Insull was vice-president in charge of manufacturing. But Mr. Sargent had determined to open an office of his own, and in August, 1890, he returned to Chicago to establish himself as an independent electrical and mechanical engineer. The firm of Sargent & Lundy was formed in 1891.

In 1891 and 1892 Mr. Sargent was consulting electrical engineer for the World's Columbian Exposition of Chicago, and he designed the power plant and had much to do with the other mechanical and electrical features of the great World's Fair of 1893.

The original Edison central station in Chicago was at what is now 120 West Adams street, and was built in 1887 and 1888. Mr. Sargent made the plans for the machinery layout of that station. In 1892 Samuel Insull came to Chicago as president of the Chicago Edison Co., and that company at once took on a new lease of life. Under Mr. Insull's direction the old Harrison street generating station was built in 1893. Mr. Sargent was the designer of that station, also the Fisk street, the Quarry street and the Northwest generating stations of the Commonwealth Edison Co.

Mr. Sargent was one of the first electrical and mechanical engineers who recognized the great part that the steam turbine was destined to play in the development of electric generating stations. The Fisk Street station was the pioneer of all the large turbine central stations of the world and it became deservedly famous for its many original features of design and for the simplicity and economy of operation. After this station had been in operation for a short time Mr. Sargent was sent to London as a representative of the United States on the hearing in Parliament in connection with the London power-supply bill. This hearing crystallized in Mr. Sargent's mind some ideas he had been developing about the importance of unified power supply for great industrial centers so as to reduce the cost of production, and on his return he submitted his ideas to Mr. Insull and they were worked

out in the power-station development of the Commonwealth Edison Co.

Mr. Sargent's engineering work, however, was not confined to Chicago. He was consulting engineer for many of the important electric light and power companies throughout the country, including the Edison Electric Illuminating Co., Boston; American Gas & Electric Co., New York; Electric Bond & Share Co., New York; the Union Gas & Electric Co., Cincinnati, as well as many other smaller organizations. He designed the great combined central power station of the American Gas & Electric Co. and the West Penn Power Co., located on the Ohio river north of Wheeling, W. Va., which is the first large electric station to be built in a favorable locality near a coal mine for the distribution of power to industrial centers at long distances. He designed the new station of the Union Gas & Electric Co., at Cincinnati, which has recently been completed. He also designed the new station for the Kansas City Light & Power Co., which is soon to be put into operation. He went to Chile in 1916 as consulting engineer for the Guggenheim mining interests on the development of a power supply for their mine at Chuquicamata. During the recent war Mr. Sargent was consulting engineer for the power station at the Edgewood Arsenal at Edgewood, Md., and also consulting engineer for the United States Government in other war-time projects demanding the application of power on a large scale.

The decedent was awarded a medal by the World's Columbian Exposition in 1893. He was also a member of the jury of awards in power engineering at the St. Louis Exposition of 1904. He was a member of several societies and clubs, including American Society of Mechanical Engineers, Western Society of Engineers, University Club, Chicago Yacht Club and Skokie Country Club, and Engineers' Club of New York.

Mr. Sargent was married to Miss Laura S. Sleep at Sioux City, Iowa, in 1885. The widow, one daughter, Miss Dorothy Sargent, and two sons, Chester Sargent and Ralph Sargent, survive.

In his profession Mr. Sargent was noteworthy for the clear vision and strong common sense with which he grappled with the essentials of an engineering problem. He was simple, clear, direct and practical. He was a man of broad outlook, tolerant, modest, seeking results rather than to uphold theories. And he was eminently successful in obtaining results, for his electrical generating stations were milestones of achievement in the economical production of electrical energy. He stood in the front rank of those men whose efforts have made electricity cheap for the people—an everyday necessity in the home and factories of the United States.

An idea of the esteem with which Mr. Sargent was held by his business associates was shown in an interview with Wm. S. Monroe, his friend and partner in business for many years, who said:

"Mr. Sargent had an exceptionally keen and active intellect and a vigorous and forceful personality. He was a man of absolute integrity and fearless independence and high idealism in his work. He had an infallible intuition regarding engineering and scientific matters, and the responsible men in the companies for which he was doing his engineering learned to place the utmost confidence in his judgment. He had a remarkable combination of extreme daring and careful conservatism. With a broad and ambitious view of important and fundamental principles of his engineering work, Mr. Sargent combined an accurate knowledge of all the underlying details, and no detail was too small for his personal attention.

"He kept in close touch with everything that was new in the engineering profession. He was a great traveler and made repeated trips to Europe as well as through this country in order to post himself on the important developments—not only in the direct line of his own work but in all departments of the engineering field.

"His idealism was at times almost prophetic and he was very ambitious for the highest achievements in his work, but his idealism was held in restraint by a practical common sense judgment, which combined to give a distinct originality to every new power station which he designed, and made it systematic and harmonious, economical and a perfect working machine."

Samuel Insull, for whom Mr. Sargent did most of his important work, held his engineering ability in high estimation. In a speech delivered in December, 1911, Mr. Insull spoke of Mr. Sargent as "at the head of his profession, the electrical engineering profession, in this community, and the designer of our wonderfully economical central stations." In many other speeches he also took occasion to praise Mr. Sargent and his ability.

A large number of messages, further evidence of the esteem in which he was held by his associates and friends, was received by Mr. Insull and the family from men prominent in the electrical industry and the engineering profession among whom were the following: C. A. Coffin, J. B. McCall, Guy E. Tripp, E. W. Rice, Jr., and J. W. Lieb.

SURVEY ON PLANS FOR IMPROVING INDUSTRIAL RELATIONS.

National Association of Corporation Schools Issues Statement on Results Achieved in Various Industrial Organizations.

To what extent the readjustment of working conditions in the industries of the United States is giving the workers a voice in management at the moment is difficult to determine. The effort to democratize the industries is making steady progress, but so far results are not conclusive.

The National Association of Corporation Schools, with headquarters in New York City, is studying the problem of a more equitable distribution of created wealth through industrial pursuits, and also attempting to eliminate present wastes due to lockouts, strikes and other forms of industrial strife, through scientific employment, training of the industrial workers and other personnel problems. This association, in which some 133 of the larger industrial institutions of the United States have membership, including prominent electrical utility companies, advises that a recent inquiry among several hundred industrial corporations reveals that there are three plans that are being used, all designed to give employes more voice in management, especially as relates to working conditions, hours and wages. The results of the inquiry indicate that a considerable majority of the larger industrial institutions have either inaugurated some one of the three plans or are studying the various plans and gathering data on results so far obtained, with a view to determining which of the plans they will inaugurate.

These three plans are known as the "Works' Committee" plan, the "Industrial Council" plan and the "House and Senate" plan. The purposes of the three plans are practically the same, but the method of operation differs. So far as known, none of these plans involves direct representation on the part of the workers on the board of directors. However, it is anticipated, if it is found as a result of experiments that employes assume the responsibility, which logically they must assume if they are to have a continuing voice in management, that ultimately employes will be permitted to name a minority representation upon the board. Such action probably will occur only in industrial institutions where a considerable number of employes are stockholders, and the representation which they secure upon the board of directors will be dependent upon the amount of shares of stock represented by the employes who have a right to vote for such representation.

In one of the largest industrial institutions, where the "industrial council" plan has been made effective, the immediate result was a request on the part of the employes' representatives in the industrial council for an increase in wages and shorter working hours. This was followed by an avalanche of requests from individual employes for increases in wages. When it was pointed out to the representatives of the employes by the members of the industrial council representing the stockholders and management, that such action would necessarily involve an increase in the cost of the product of the company, and that this increase would bring the selling price of the company's product to a figure considerably higher than the selling price of its competitors, the request for shorter hours and increased wages were temporarily, at least, withdrawn. In other words, the immediate results of giving a voice to employes through delegated representatives were wholly selfish and not based upon investigation as to conditions, and were made without any assumption of responsibility whatsoever.

In at least three large industrial institutions where some one of the three plans has been introduced, strikes have followed within a period of one month. In other companies the plans have worked well, although the period of trial is of too short duration to admit of any conclusions as to what will be the final results and as to what definite attitude the representatives of employes may ultimately take. The assumption may be safely made, however, that employes of industrial corporations will continue to demand a voice in those problems of management which affect wages, working conditions and hours of labor. Whether or not the representatives of the workers in industrial councils will assume a fair portion of responsibility remains to be determined. So long as shorter hours and higher wages can be secured through strikes, it is probable that the new co-operative plans will make slow progress, but when the time arrives, as it inevitably must arrive, that strikes are no longer so successful, and when the public will demand to be heard in the settlement of wage disputes, it is believed that more constructive progress can be made in the working out of co-operative management, and that the workers will then assume a more definite responsibility for production. It is obvious that responsibility must be assumed by the workers if the industries of the United States are to be placed upon a more democratic or co-operative basis. Efforts to introduce better training systems and more scientific employment methods are meeting with no opposition and are progressing steadily. Also, efforts to encourage thrift (to include home owning), group insurance and sick and death benefit features are meeting with encouragement.

The survey also disclosed that plans to insure stock ownership by employes in the company by which they are employed are rapidly becoming installed, the number of companies now installing this feature being far in excess of the number that were working on similar plans prior to the reconstruction period. Stock-ownership plans almost invariably include provision for service annuities or retirement pensions.

The belief expressed by Judge Gary, chairman of the United States Steel Corp., that efforts to unionize the employes of the various subsidiary companies of that corporation would not succeed because the men realize they are better off under "open shop" conditions than they would be under the control of unions, is assumed by many other industrial executives. In fact the present effort is not only to secure employe or co-operative effort in management, with proportionate responsibility, but also to provide conditions whereby the workers of the larger industrial institutions will receive a greater degree of advantage than would be possible under the customary unions' control and direction.

The crux of the situation seems to be acceptance of responsibility by the representatives of the workers for greater output commensurate with shorter hours and higher wages.

FORTHCOMING MEETINGS OF THE AMERICAN INSTITUTE.

Dates of Pacific Coast Convention and Other Meetings Announced.

Pacific Coast Convention.—The Pacific Coast convention of the American Institute of Electrical Engineers will be held September 18-20, 1919, at Los Angeles, Cal., under the auspices of the Los Angeles Section.

New York Meeting.—A joint meeting with the Institute of Radio Engineers will be held in New York City on October 1, 1919. The subject of this meeting will be Radiotelegraphy.

Philadelphia Meeting.—On October 10, 1919, a regular meeting of the A.I.E.E. will be held in conjunction with the American Physical Society. This meeting will be under the auspices of the Electrophysics Committee.

New York Meeting.—A regular Institute meeting under the auspices of the Power Stations Committee will be held in New York City on November 14, 1919.

CHICAGO CONTRACTORS HOLD ENJOYABLE OUTING.

The Chicago Electrical Contractors' Association held an outing at the Olympia Fields Country Club on July 30 which proved to be one of the most enjoyable affairs ever conducted by this association. On this occasion the members and their guests competed in numerous athletic events, the most interesting of which were the golf tournaments. Many valuable prizes were presented to the winners of these contests and tournaments.

In addition to the members, there were present representatives from practically every branch of the industry who took a prominent part in the events.

Commercial Practice

Review of Electric Range Handbook — Priority in Event of Service Curtailment — Rates for Service Extensions

NEW HANDBOOK CONTAINS VALUABLE INFORMATION AND DATA.

Brief Review of "Electric Range Handbook" Published by Society for Electric Development.

The Electric Range Handbook prepared and published by the Society for Electrical Development, United Engineering Societies building, New York City, is a complete compilation of authentic information and data on this electrical appliance. As the rapidly growing interest in electric cookery, and the many advantages that electric cooking apparatus offers as a load builder have made the electric range one of the most important and prominent factors in the industry at the present time, the value of such a book can readily be appreciated.

It consists of 208 pages, attractively illustrated, bound in flexible leather, and is dedicated "to the national conservation of fuel, food and labor and to greater efficiency and economy in the home."

Its purpose is to guide and assist central-station managers who have realized the importance and profit of the electric range load and are contemplating the establishing of a special service rate and the merchandising of ranges. A secondary purpose is to stimulate greater range activity in general and to show the way to more extensive sales to manufacturers, jobbers and contractor-dealers.

The information and recommendations are based on the experiences and policies of a number of central stations which have pioneered and placed the sales and service of the electric range on a definite, successful and profitable basis. The text has been reviewed and approved by range authorities and cannot be materially affected by changing conditions, as the fundamental methods of merchandising and maintaining this load builder will remain unchanged.

In the first chapter the fundamental facts concerning the electric range are stated. Its value and desirability as a load to central stations are clearly shown and compared with other household appliances, followed by a general discussion of the advisability of establishing special rates for such service and the justification of such rates as shown by public service commission rulings. In addition, the various methods of financing extensions for such service that have been developed by many companies are reviewed and a valuable collection of data from 100 central stations is presented.

In the second chapter the modern electric range, its practicability and supremacy, construction and price, operating cost and economy, and its many advantages when used in the home are described. In addition, kitchenette ranges, which are in considerable demand for smaller and more compact apartments, and the many ingenious methods of installing them are also shown.

The third chapter is devoted to electric cookery, its development, advantages, characteristics, methods of application and principles, while the fourth chapter is a study of the desirability and advantages of the range load and its characteristics.

Chapter five explains the methods of installation with special attention being given to the methods of determining the proper size of conductor and the necessary wiring connections.

Chapters six, seven and eight are devoted to the merchandising of electric ranges and are entitled: merchandising methods, selling points, and advertising, respectively. Each of these chapters contains a fund of information on its particular subject and should prove of great assistance to the central-station manager and salesman in the conduct of their range business.

Service and maintenance are the subjects discussed in chapter nine. Selling a range, it is explained, is 10% salesmanship and 90% service and there are four divisions to this service: buying service, installation service, current service and maintenance service. The advantage of educating the new user in the proper methods of range operation and its fundamentals is also shown.

Every company attempting to encourage the use of electric ranges is confronted with the problem of heating water electrically in conjunction with the range and for this reason the various types of water heaters, their advantages and application are described in chapter ten.

Commercial cooking and the heavy duty apparatus designed for this apparatus are described in chapter eleven, while the final chapter consists of a compilation of general information on the subject.

The book is being sold by the Society for Electrical Development for $1.50 per copy and at least one prominent electric range manufacturer has purchased a supply which will be distributed in connection with its sales work.

COMMISSION RULING GOVERNS PRIORITY IN SERVICE CURTAILMENT.

Public Service Commission of Missouri Includes This Important Feature in Recent Decision.

The ruling of the Public Service Commission of Missouri in its proceeding against the St. Joseph, Light, Heat & Power Co. of St. Joseph, Mo., recently, brought out one especially interesting and important provision governing the conduct of such combined utilities. This provision states the priority to be given in the rendition of the different classes of service such as electric service, heating service and the street railways in the event of an occasion arising which prevents the rendering of all three classes. This ruling is particularly significant at the present time as many authorities predict a serious fuel shortage during the coming winter which may bring some utilities face to

face with extreme conditions that demand a curtailing of service.

The proceeding was instituted by the commission to determine whether the service rendered to the public by the company was adequate and sufficient. The company conducts a combined plant supplying electric service and heat, and operating the street railways of the city.

According to the evidence it was found that the service until early in 1918 had been entirely adequate. At this time an interruption occurred due to failure of some plant equipment. This failure was remedied and no further trouble was experienced until Jan. 2, 1919, when a failure in the local water supply, caused by an ice gorge, required the complete suspension of the operation of the plant. An emergency pipe line was run to the river to overcome this difficulty but due the large amount of sand and gravel in the river water which clogged the boiler feed-pipes and pumps and resulted in low water in the boilers and the blowing out of boiler tubes, the interruptions to the service still continued.

The commission therefore ordered the company to provide additional equipment as a precaution against such failures in the future and also to provide a sufficient auxiliary water supply, independent of the city water supply, for boiler feed purposes.

The commission also ruled that in the event it became necessary to curtail the service in the future, priority shall be given as follows:

"A.—Steam-heating service, except during the morning and evening rush hours of the street railway service.

"B.—The street railway service in general.

"C.—The lighting service.

"D.—The power service.

"Before cutting out the power circuits, the company shall notify the power users for such reasonable time in advance as may be necessary to prevent undue amount of damage."

The commission also made the following statement relative to the efficiency and ability of the company's organization: "It is only fair to state in connection with the investigation that the manager and the supervising engineers are thoroughly competent and are making every effort to restore adequate service."

In conclusion, the finding states:

"The Commission has recently authorized a general rate increase for the various public services rendered by the defendant company. This increase has been granted upon the assumption that the service rendered was then and would continue to be fully adequate and sufficient. A continuation of inadequate service to the public may necessitate further consideration by the Commission of the reasonableness of the present rate schedules, since the charging of just and reasonable rates must be accompanied by the rendition of adequate and satisfactory service."

Commission Also Permits Company to Discontinue Service.

The commission, feeling that the broad and comprehensive powers conferred upon it necessarily imply the power to relieve a utility from rendering service where the facts warrant such action, also delivered a decision permitting the Marshfield Electric Co. of Marshfield, Mo., to discontinue operation at the end of a six-month period. The evidence in this case showed that the company was operating at a decided loss and that an adequate rate increase would not remedy this condition.

The real difficulty at Marshfield appears to arise because of the small proportion of citizens using electricity. While the city has a population of about 1500 and approximately 300 homes, there are only 190 connected consumers. An increase of rates would certainly not tend to increase the number of consumers but would reduce the number of present consumers and the quantity of current consumed. Therefore the Commission held that a rate increase within practicable limits offers no solution of the difficulty.

NEW MINIMUM RATES FOR SERVICE EXTENSIONS.

Puget Sound Traction, Light & Power Co. Files New Minimum Monthly Charges.

Proposing a plan by which the cost of extension of electric light service to residences not located on established circuits of the company will largely be borne by the consumer for whose benefit the extension is made, the Puget Sound Traction, Light & Power Co., of Seattle, has filed a schedule of rates with the State Public Service Commission of Washington, which under the 30-day provision of the law are not changed as to the kilowatt-hour consumption, but the new schedule affects the minimum charged the consumer who requires an extension to secure service.

For one customer, where one pole and service extension is required, a minimum rate of $2 a month is to be charged. For one customer, two poles and extension, the rate is $3 minimum. For two customers, one pole and extension, a minimum of $2 each is charged and for two customers, where two poles are required the minimum rate is $2 each per month. All contracts under the new tariff are for a period of three years. Under the present schedule the minimum charge is $1 a month.

The new tariff is filed on behalf of the subsidiaries of the Puget Sound Traction, Light & Power Co. and affects Seattle and King county, Tacoma and Pierce county, Everett and Snohomish county, Bellingham and Whatcom and Skagit counties.

BIG GAINS IN BUSINESS AT MINNEAPOLIS.

More Electrical Appliances Sold in First Six Months of This Year Than All of Last Year.

During the first six months of 1919 the Sales Department of the Minneapolis General Electric Co. disposed of more electrical appliances than during the entire 12 months of 1918. A comparison of these figures and other new business secured for the first six months of 1919 with the corresponding period of 1918 is as follows:

	1918	1919	Increase
Already built houses wired	1847	2067	12%
Appliances sold (number)	1701	1964	15%
Appliances sold (value)	$15,656.32	$47,861.03	205%
Ranges sold (number)	62	208	235%

During the week ended July 4, the sales department took contracts for 345 new electric light and power customers with 191 kw. of light and 607 hp. in motors. The net gain in business connected for the week was 165 customers with 179 kw. of lighting and 162 hp. in motors. The electric energy output for the week was 36.6% greater than for the corresponding week of last year.

Operating Practice

Instantaneous Detection of Generator Fire—Knife-Switch Inspection—Advantages of Parallel Feeders—Line Costs

PROPOSED METHOD OF DETECTING FIRES IN TURBOGENERATORS.

Outgoing Air to Be Used as Tell-Tale of Conflagration in Big Machines.

Turbogenerators may have caught fire and be burning for some considerable period of time, comparatively speaking, before the fact is discovered by the operating force. And by that time affairs have well advanced and damage that leads to still worse damage has usually occurred.

One way of enabling the internal conditions of turbogenerators to be watched is to enable the condition of the outgoing air to be made visible; another is to have some sort of indicator installed so as to indicate the passage of smoke or flame with the outgoing air. In some instances glass windows, of leaded glass, have been used, and in this way enable the operating force to see into the outgoing air passage. However, such a practice is unreliable, since inspection is necessary to make the practice reliable; and at best an inspection may not tell the whole story.

In one recent instance of a company operating a large number of turbogenerators, several of which have caught fire and destroyed themselves during the last three or four years, the outgoing air is passed to the boiler room, where its heat is used by the fuel beds of the furnaces, thereby increasing the efficiency somewhat. To prevent an internal turbogenerator fire existing unnoticed in this installation it has been proposed to install an indicator by which any abnormal condition of the outgoing air can be readily detected. This indicator will consist of a metallic pipe, of a cross-section small compared to the total cross-section of the air duct, for example about 1 ft. diameter, which would be located at the exhaust of the generator in the turbine room. In this way any sparks, flame or smoke going through the air duct would come to the attention of the operating force in the operating gallery or on the turbine-room floor.

PERIODIC INSPECTION OF KNIFE SWITCHES ADVOCATED.

Reduction of Energy Loss and Better Regulation at Heavy Amperage.

By B. Hamilton.

In stations transmitting heavy amperage as, for example, substations supplying Edison three-wire systems, there are many heavy-ampere knife switches, most of which are loaded a considerable portion of the 24 hours. Also in many large industrial establishments using either alternating or direct current, the former at 220 or 440 volts, the current values may attain considerable magnitude.

Heating occurs at the knife switches, sometimes because the current exceeds the switch rating and more often because the surface of contact between the blade and the clips is not the best. With alternating current there is an added loss due to eddy currents.

The heating at switches, when excessive, represents a waste of energy; it causes a voltage drop that tends to interfere with voltage regulation and often times causes injury to the switch. The writer has found switches where the blade and the clips had become so heated as to be almost welded together so that the switch could not be opened readily, nor when once opened closed again.

The remedy is to make periodic inspection of switches carrying heavy currents. This inspection may merely consist of feeling the switch by hand to determine temperature or may consist of taking measurements of voltage drop across the switch and between blades and clips. Heating due to poor contact can be reduced by cleaning the surfaces of contact. Wiping these surfaces with a thin layer of vaseline also reduces the drop, although but only a small quantity of the lubricant should be employed. Some of the larger companies handling heavy currents over many switches have determined limits of heating and voltage drop above which they do not allow their switches to go. The practice is a worthy one.

PARALLEL OPERATION OF FEEDERS REDUCES CABLE BREAKDOWNS.

Reduction of Investment Also Additional Benefit Obtainable from Parallel Feeders.

The savings which can be effected by a parallel operation of feeders depends in a large degree upon the design of the transmission system and the ratio of the capacity of the line to the capacity of the individual synchronous converters or transformers, which are supplied by this feeder. In one system supplying converters varying from 500 to 4000 kw. in size together with step-down transformers in substations of 1500 and 3000 kw. capacity and also industrial substations on the premises of customers ranging from about 500 to 4000 kw. in capacity, it was estimated that if the feeders could be operated in parallel then a saving of 20% could be made in the amount of investment. This fact was brought out at the recent A. I. E. E. convention. As the installation in question had a book value of about $5,000,000, there was a possible saving estimated at $1,000,000. This company has been operating feeders in multiple for about two years. During this period they have realized nearly 40% of the possible saving in the investment in feeders, and this has been secured by an actual reduction in the number of feeders, notwithstanding a considerable increase in the maximum load.

The same company also reports in the four years preceding the installation of the relays permitting parallel operation of feeders that they averaged 27

burnouts per year which could not be definitely ascribed to external causes, while in the two years since the feeders have been operated in parallel, the corresponding figure was 16 burnouts. This would indicate a reduction of 40% in the burnouts of cables due to operation of the feeders in multiple, although the cables were actually more heavily loaded. While the time is rather too short to accept these figures as final and conclusive, it apparently indicates that the operation of feeders in parallel reduces the number of troubles due to internal causes.

ITEMIZED COST OF 33,000-VOLT TRANSMISSION LINE IN CENTRAL ILLINOIS.

Line Built During War to Supply Coal Mine with Central-Station Service.

The itemized cost of constructing this transmission line, together with a list of material, is appended:

POLES.				
430	6-in. by 35-ft. steel poles with single arms and bayonets	@	$33.00	$14,190.00
10	6-in. by 35-ft. steel poles with double arms and bayonets	@	37.80	378.00
13	6-in. by 35-ft. steel poles with corner equipment and bayonets	@	31.80	413.40
42	6-in. by 40-ft. steel poles with single arms and bayonets	@	40.82	1,714.44
2	6-in. by 40-ft. steel poles with double arms and bayonets	@	45.62	91.24
4	6-in. by 40-ft. steel poles with corner equipment and bayonets	@	44.42	177.68
7	6-in. by 45-ft. steel poles with single arms and bayonets	@	45.03	315.21
3	6-in. by 45-ft. steel poles with corner equipment and bayonets	@	43.83	131.49
3	6-in. by 50-ft. steel poles with single arms and bayonets	@	75.90	277.70
4	6-in. by 50-ft. steel poles with double arms and bayonets	@	80.70	322.80
1	6-in. by 50-ft. steel poles with corner equipment and bayonets	@	74.70	74.70
24	7-in. by 30-ft. cedar poles for guy stubs	@	5.25	126.00
	Total cost of poles			$ 18,212.66
MATERIAL FOR LINE.				
1,675	No. 5005 Victor insulators	@	$ 3.258	$ 5,457.15
1,675	No. 44661 Keystone truss pins	@	0.8583	1,437.65
500	No. 11535 Ohio Brass disk insulators	@	2.34	1,170.00
166	No. 11541 Ohio Brass dead-end clamps	@	2.09	346.94
138,000	lb. No. 1 B. & S. solid copper wire	@	0.275	37,950.00
160,000	lb. 5/16-in. double galvanized ground wire	@	0.0165	2,568.00
450	sacks cement	@	63.75	318.75
5	cars of gravel			161.77
	Miscellaneous small material			2,587.39
	Total cost of material			$ 51,997.65
LABOR COSTS.				
	Engineering surveying for pole line			$ 822.30
	Unloading poles and material			345.45
	Hauling poles			910.57
	Hauling gravel			192.71
	Cutting and removing trees within 30 ft. of line			1,197.56
	Distributing arms, pins and bayonets			366.80
	Fitting poles with arms, pins and bayonets			871.83
	Digging pole and anchor holes			1,180.39
	Erecting poles			2,032.55
	Hauling cement			93.05
	Mixing cement and gravel and tamping poles			1,597.90
	Miscellaneous hauling			740.28
	Placing guys			711.98
	Putting on insulators, stringing wires, tieing in conductors and clipping in ground wire			3,534.97
	Moving telephone lines to clear right-of-way			822.40
	Storm guying			432.00
	Total cost of labor			$ 15,852.74
RIGHT-OF-WAY.				
	Pole line right's			$ 3,832.00
	Trees			827.50
	Labor and purchase of right-of-way			841.58
	Livery and expense			978.03
	Total cost of right-of-way			$ 6,479.11
				$ 92,542.16
	Overhead expense			9,254.21
	Total cost of line			$101,796.37
	Cost per mi.			$ 3,181.14

POWER TRANSMISSION AT 220,000 VOLTS.

Much interest has been aroused in the paper by A. E. Silver before the recent Lake Placid convention of the A. I. E. E., in which he discussed the possibilities, theoretical and practical, of power transmission at 220,000. An abstract of this paper appeared in ELECTRICAL REVIEW July 12. The following gives another aspect of this subject.

Certain features of the problem are high reactance of generators and transformers, ample insulation of transformers and an efficient oil circulation system, high mechanical strength of oil switches, avoidance of low-voltage buses and low-voltage paralleling, and an effective and dependable system of relay sectionalizing. All line switching, automatic or manual, should be done on the high-voltage side of transformers. The amounts of power involved, particularly under abnormal conditions, are so tremendous that the current values obtaining at lower voltages impose switch duties and heavy stresses generally which could be handled only with great difficulty and at an expense materially higher than would be required at 220 kv., when the currents involved are relatively small. No equipment of any character is contemplated for protection against over-voltages.

Contracting-Construction

How to Make Old House Wiring Pay—New York Contractors Hold Outing—Evansville Electrical Firm Reorganized

SUCCESSFUL METHODS OF CONDUCTING OLD HOUSE-WIRING BUSINESS.

How Dempsey & Meade, Chicago, Makes This Class of Work Pay Real Profits.

Among the electrical contracting firms in Chicago that specialize in the wiring of already built buildings, one of the most successful is Dempsey & Meade, located at 3153 W. Madison street. Organized in 1908, this firm through the persistent efforts of its owners and the up-to-date business policies they adopted, has grown rapidly until at the present time it occupies a prominent place in the local contracting fraternity and enjoys an enviable reputation throughout the city.

Schedule_____.

Dear Sir:-

We wish to respectfully submit you an estimate of_____ for wiring your _____story_____residence for electric light at the above address, and_____for furnishing and installing fixtures for same as hereinafter noted:

The work to be done under this contract will consist of wiring _____outlets for_____lights; _____outlets for single and double pole switches; and _____outlets for 3 way switches, as follows: Ceiling height_____ft._____in._____meters.

LIGHT OUTLETS Telephone No._____

Location	Ceiling	Wall	Baseboard	Lights	Switches	Fixtures
Porch						Ceiling holder, bracket or chain pendant
Vestibule						Ceiling holder, bracket or chain pendant
Hall						Chain pendant or bracket
Hall						Chain pendant or bracket
Stairs						Chain pendant or bracket
Parlor						Semi-direct bowl or shower
2nd Parlor						Semi-direct bowl or shower
Dining room						Shower or bowl with ( ) drop shades to match
Library						Shower, bowl, or chain pendant
Sitting room						Shower, bowl, or chain pendant
Pantry						Drop cord and guard
Kitchen						1-1x1 pendant
Basement						Drop cord
Laundry						Drop cord
Upper hall						Chain pendant or bracket
Bedroom						Chain pendant or bracket
Bedroom						Chain pendant or bracket
Bath						Chain pendant or bracket
Attic						Drop cord

Fig. 1—Contract Form That Provides for Description of Work to Be Done.

One factor contributing to the success of this concern is that it has specialized in this particular field of electrical work, educating its workmen in this line and building up its organization to best meet its special requirements. Just now, this organization has been developed along this line to such an extent that it has not as yet been deemed advisable to branch out into new building work although recently the opportunities for such work have been very good.

Another is its policy with relation to its customers, competitors and the electrical industry as a whole. Early in its existence the firm began a policy of good service in addition to a high quality of work and its acitvity in this respect is largely responsible for its present position. In order to avoid any misunderstanding with its customers and to correct any difficulties that may arise as soon as possible, arrangements have been made so that the customer must sign forms stating that the work already done is entirely satisfactory before any job can proceed or is considered completed. It has also co-operated in many ways with the other local branches of the industry and its members are very active in local electrical organizations, Mr. Meade being president of the Commercial Electrical Contractors' Association.

A third and equally important factor is its policy to determine accurately and promptly the exact cost and profit on every job and not to take any work at a price which will not show a suitable profit. Its attitude in this matter is ably expressed by Mr. Meade, who says "If you want to gamble on a building, buy it."

To accomplish this every job is costed immediately upon its completion which shows whether the method of estimating is correct or not and also the performance of the workmen on that job. The firm endeavors to employ only the best and most efficient workmen and as a reward endeavors in turn to keep them employed as continuously as possible.

Fig. 2—Material Sheet Used by Dempsey & Meade, Chicago, for Keeping a Record of All Materials Used.

The methods and forms which it has developed for its use are very simple and designed to eliminate confusion or duplication as much as possible. The form shown in Fig. 1 is the first page of its contract. On this form space is provided for the price of the job, a brief description of the building and the total number of outlets, lights, switches, meters, etc. Below provisions are made for the listing of each outlet and switch, together with its location in the room. On the right is listed a description of the fixtures ordinarily used in such rooms, the ones not selected being scratched out by the estimator. Space is also provided to insert the number of sockets desired in the fixture. The second page of the contract provides for the method of payment, and the signatures.

When the contract is received at the office it is given to the foreman who goes to the job and orders out the material on the form shown in Fig. 2. On this form practically every class of material used in this work is listed with four columns opposite marked Materials Out, Materials In, Materials Used and Materials Cost. The first of these columns is used by the foreman in ordering the material for the job. The second and third are filled in by the workman after he has completed the job and records the amount of materials left over to be picked up and the amount used which is obtained by subtracting the quantity shown in the second from that in the first column. The materials used are costed at the office and recorded in the last column.

The labor charges are recorded on the form shown in Fig. 3. On this, spaces are provided for the journeymen's name, the total number of hours of labor on the job. Below this is a space for listing the number of outlets or fixtures, their description and location as taken from the contract form. A separate labor slip is provided for the different wiring operations. Below the description of the installation space is provided for the customer's signature stating that the work as done is satisfactory.

The form shown in Fig. 4 is a small card used

Dempsey & Meade Time and Material Ticket

Name .....

Address .....

Workman	Labor ..... hours
Job taken	.....
Job started	.....
Job completed	.....
Inspection	.....

MATERIALS

This certifies that this work has been satisfactorily completed

Customer's Signature.....

Fig. 3—Time and Material Ticket.

for recording the time and materials used in small repair or additional jobs. As on the previous forms space is also provided here for the customer's signature.

A large percentage of the wiring jobs done by the firm is taken on a time-payment plan. The financing of this plan is done through the Commercial Electrical Contractors' Association by a local banking house. The method employed in the operation of this plan is for the customer to sign interest bearing notes, for which suitable forms have been devised, which are purchased from the contractor by the bank. At present the company itself is making the collections on these accounts.

In spite of the success that the company has achieved in this field of contracting, the members

DEMPSEY AND MEADE

Time and Material Ticket

Name _____

Address _____

Labor _____ *hours*

Materials used _____

_____

This certifies that this work has been satisfactorily completed.

Customer's Signature _____

Fig. 4—Form Used for Keeping Records of Time and Material on Small Repair Wiring Work.

are convinced that the real opportunity lies in the merchandising field and for this reason it has already started to build up an organization to carry on this work on an extensive scale. The possibilities of merchandising were quickly realized by this concern when it first took part in the co-operative sales campaign inaugurated in Chicago about two months ago. The results obtained thus far without any intensive sales effort being made have greatly exceeded all expectations. For this reason the company plans to double the size of its present quarters, hire salesmen and solicitors and to develop another organization to work in conjunction with its present one as quickly as possible.

NEW YORK CONTRACTORS HOLD ANNUAL OUTING.

The fifteenth annual outing of the Independent Electrical Contractors' Association of Greater New York was held at Grant City, on June 21. On this occasion the members and their guests participated in numerous athletic events which were closely contested and in addition several novelty and entertainment features were introduced, including running the prohibition law. About 400 men representing the various branches of the electrical industry were present and the consensus of opinion seemed to be that this was the finest affair of its kind ever held by the association.

EVANSVILLE ELECTRICAL CONCERN REORGANIZED.

The A. L. Swanson Co. of Evansville, Ind., one of the largest concerns in that section engaged in electrical construction, repair and maintenance, and jobbing work, has recently reorganized and in the future will be known as the Swanson Electric & Manufacturing Co. The purpose of the reorganization was to increase the capital of the company in order to extend its jobbing and manufacturing facilities. A. L. Swanson, chairman of the Indiana State Association of Electrical Contractors and Dealers, will remain as president of the new concern.

Contractor-Dealer

New Merchandising Companies Formed—Successful Window Displays—Methods of Securing Children's Friendship

COMPANY FORMED TO RETAIL ELECTRICAL PRODUCTS IN CHICAGO.

Home Appliances, Inc., Plans to Open Several Attractive Retail Electrical Stores.

The Home Appliances, Inc., has recently been organized in Chicago for the purpose of merchandising electrical household appliances on an extensive scale. The company plans to open three attractive stores in this connection, one on the north side of the city, one on the west side, and one on the south side. The north side store is to be located at 3301 Lawrence avenue and is expected to be ready for business shortly. The one on the south side will be located at 6530 South Halsted street. Both of these locations are in the heart of thriving business districts where the need of attractive electrical stores is evident. The location of the third store has not as yet been decided upon but it is expected that a prominent store in one of the numerous business communities of that section will be arranged for shortly.

The new firm will handle the complete line of Western Electric Co. products for home use and will also carry a large stock of other merchandise, such as ornamental floor and table lamps. The stores will be made as attractive as possible and conducted along the most approved modern merchandising methods.

George Ledell, formerly of the Electric Shop of the Commonwealth Edison Co., has been appointed general manager of the new company. Mr. Ledell has had considerable experience in the retailing of electrical merchandise, which insures the success of the new enterprise to a large extent.

NEW ELECTRICAL FIRM ORGANIZED IN ROCHESTER, MINN.

Rochester Electric Co. Plans to Carry on an Extensive Merchandising and Construction Business.

A new company to be known as the Rochester Electric Co. has recently been incorporated at Rochester, Minn., for the purpose of conducting an electrical contracting and merchandising business in that section. The incorporators are E. M. Raety, William F. Hines and Henry Blink, all of Rochester, and who have been intimately associated with the electrical industry for many years and have had considerable experience in their particular lines.

The new firm has already secured a considerable amount of construction work, one of its most important jobs being the men's dormitory at the Rochester State Hospital. In the merchandising field it is the present intention to specialize on Hughes ranges, Packard lamps, Columbia dry cells, Emerson fans, Simplex ironers, Thor washers and the Hotpoint line, and in the thriving city of Rochester with its many hospitals and hotels the company anticipates a good patronage.

ATTRACTIVE WINDOW DISPLAYS THAT PROVED SUCCESSFUL.

Recent Advertisements and Window Decorations That Have Produced Results.

By W. B. Stoddard.

Comparisons may be odious but when they point such an effective moral as the comparative displays of the Bureau of Power, Los Angeles, Cal., they are decidedly to be commended especially from a publicity standpoint. In urging the wiring of the house for electricity, and playing up the advantages of electrical equipment, this company recently arranged two windows. The first showed the old fashioned household conveniences,—the candle, the kerosene lamp, and the open flame gas jet; the frazzled broom; the rusty flatiron; the coffee pot; and the gas toaster that always burned the toast. A card on the floor observed: "The Old Way." The second window showed the Mazda light; in an art metal stand lamp; the capable vacuum cleaner; the electric iron; the aluminum percolator; and the electric toaster that toasts so evenly and crisply. A card at one side observed: "Be Up-to-Date—Wire Your Home Now." On the wall was a big white disc with the figure "5 Cents." Beneath this was another card advising what this small amount of money can accomplish in comfort and convenience when used to purchase electricity.

Attractive Vacuum Cleaner Display by Portland, Ore., Contractor-Dealer.

The Brooklyn Edison Co., Brooklyn, N. Y., gave a practical demonstration of the ease and comfort with which the family ironing is done by the use of electricity. A little girl of about 12 was shown manipulating an electric iron on a piece of soft white goods, the motive power being a fancy electric lamp which stood on the end of the ironing board. Piled

up in front were boxes containing these electric irons, as well as several of the irons unboxed, so that they could be seen to better advantage. Cards set up at different points in the window gave definite advice as to the advantage of electricity compared to the old fashioned iron:

No steps to and from the hot stove—
all the heat is in the iron.
One iron does all the work—
no tiresome changing of handles.
Average family ironing done at a cost of
less than 15 ct. a week.
Prepare in advance for the hot summer days. The electric iron shortens the labor—saves the strength.

The solution of the wash day problem that is puzzling the housewives in every part of the land is suggested by the Wilmington Traction Co., Wilmington, Del., in their decidedly effective display window. On the glass was pasted a clipping taken from one of the local papers:

CITY SHORT OF WASHERWOMEN

IN CONSEQUENCE, MANY HOME TRAGEDIES ARE BROUGHT TO LIGHT—WON'T COME BACK TO THE TUBS.

A washerwoman in Wilmington is as scarce as hen's teeth. The lack of this Pride of the Tubs is causing many tragi-comedies in domestic life. The 5-cent stores are doing a tremendous trade in paper table cloths and napkins, as many women have adopted these don't-have-to-be-washed substitutes for table linen until Dinah comes back to the washboard. What is puzzling the housewives is that, although munition work has stopped, the washboard ladies show no signs of returning to their tubs.

In the middle of the display was shown an electric washing machine in operation, churning the suds at a great rate, and red ribbons ran from it to cards set in racks which read,—"Let the Electric Washing Machine be your dependable washwoman—always on hand and always cheerful"; "An Electric Washing Machine will save you all the troubles and worries of wash day, and will always be on hand when wanted"; "An Electric Washing Machine doesn't require three meals per day, and doesn't ask for car fare." The inference was so plain that he who ran might read, that the way to offset the shortage of laundresses was to buy an electric washing machine and do the work one's self in half the time.

The handy vacuum cleaner was attractively shown by Olds, Wortman & King, Portland, Ore., who showed a young woman in blue morning dress operating with ease one of the latest models. The window was fitted up to represent a drawing room with an Oriental rug, curtains of maroon, with over-draperies of lace, and a wicker flower stand holding a fern. A card down in front said: "Make play of your work by using a Vacuum Cleaner," and another suggested that the observer ask for a demonstration of the work of the vacuum cleaner in her own home.

During the summer mother is planning the clothes of the family for fall and winter, and a campaign for electric sewing machines should be gotten under way without delay. A decidedly successful one is being conducted by Barker Bros., Los Angeles, Calif. In order to arouse interest from the beginning they placed a modest advertisement in the paper:

HOW MANY TIMES CAN YOU WRITE OUR NAME ON A CARD?

A series of prizes will be given to the persons writing it the greatest number of times in a legible manner, without writing it over or across other letters. Come in and ask us about it.

This announcement of course piqued the curiosity and scores came to the store to learn about the offer. Each enquirer was handed a card with the name of the firm printed at the top, the remainder of the space being left free for the contestant to exercise his skill. On the opposite side was printed: "Write the name of three electrical household appliances which you do not possess." The rules of the contest were simple: All writing must be done with ink; all words must be legible; all cards must bear the name and address of the writer, together with those of three electric household conveniences. The addresses were tabulated, and the writers circularized with pamphlets describing the advantages of the electric articles mentioned on their cards. The prizes offered were electric household conveniences, displayed in the window prior to the decision of the judges.

This contest was followed by a concise, pointed newspaper advertisement, adorned with cuts of vacuum cleaner, sewing machine motor, and electric washing machine, all operated by young matrons in neat morning dresses. These were forceful; worded as follows:

LET MODERN ELECTRIC EQUIPMENT MAKE MORE SPARE HOURS FOR YOU—COME TO BARKERS

Let us show you how quickly, easily and pleasantly you can do all your housework with better equipment—electrical, of course.

THESE ARE THE IMPORTANT TIME SAVING NECESSITIES

Electric Sewing Machine Motors Electric Vacuum Cleaners
Electric Washing Machines

The window was fitted up as a sewing room, in

"The Old Way" as Displayed by a Los Angeles Company.

And "The New Way" Shown in the Next Window.

which sat a woman making a child's dress, using an electric motor to operate the machine. A card suggested: "One can operate this sewing machine all afternoon without fatigue, as it requires head power, instead of foot power, to run it." At certain hours of the day, when traffic was heaviest, a neat maid could be seen going over the room with a vacuum cleaner; while a large card in the window advised: "Be sure to visit our model electric laundry on the second floor." This laundry was fitted up with electric washing machine, ironer, and well arranged lighting system. There was also an electric fan on a stand, and a card said: "There will be no Blue Mondays when one has a model electric laundry in which to pleasantly and swiftly do the weekly washing."

GETTING IN GOOD WITH THE CHILDREN.

Methods Employed by Merchants to Secure Children's Friendship and Its Value to the Store.

By Ernest A. Dench.

Children are more susceptible to bribery than anybody else, crooks excepted. Of course, children cannot be put in the same category as crooks, for the good and simple reason that youngsters are totally innocent of any wrong doing. If it is bribery, it is a commendable and totally inoffensive form of bribery, for it makes the children happy, eases things for their parents and attracts trade for the merchant.

Following this idea, a merchant in Tupper Lake, N. Y., secured an excellent assortment of cunning, happy dolls with cheerful faces. The customer spending $1 in the store during the three weeks set aside for the campaign received one neatly dressed doll, 11 to 14 in. high. If the purchase amounted to $5, the little girl who accompanied her mother was given a medium size, neatly dressed doll, 17 in. high. But if the little girl succeeded in inducing her mother to spend $10, she was rewarded with one large size, finely dressed doll, 20 in. high.

Charles Mayer & Co., Indianapolis, Ind., made a certain Friday a "Red Letter Day" for little girls. On this particular morning every girl in Indianapolis who possessed a doll was invited to bring her doll to the store. There was no distinction and it was pointed out that it did not matter whether the doll's clothes were torn or faded, whether the face was chipped or dirty, or the doll big or little, pretty or homely, light or dark, so long as it resembled a doll.

The only rule every girl had to observe was to pin a piece of paper to the doll with her name and address plainly stated. On Saturday the dolls were placed in the window and the overflow placed on exhibition in a prominent place inside the store. Every girl was invited to see the exhibit. On the following Monday a group picture was taken of the dolls. On Tuesday morning each girl calling at the store for the return of her doll was presented with a copy of the doll window picture.

As can be imagined, the stunt got the store talked about in thousands of Indianapolis homes solely by the mouth-to-mouth publicity of the children. It got every girl's goodwill, and aside from getting the parents interested in the store it must be remembered that the stunt will do the store good in years to come, when the little girls are grown up and have little girls of their own.

Evans, Indianapolis, Ind., recently ran a series of "Flags of Our Allies" in the local newspapers. Half of each advertisement was devoted to a reproduction of a flag and a brief description of it and the other half of the ad was devoted to the store.

In the public schools at the present time most of the history and geography lessons are being devoted to our gallant allies in the great war. This has resulted in every teacher availing herself of every means to inform her pupils more about these countries. She grasps every opportunity to get home the facts as a cat pounces upon a mouse, so the electrical dealer who assists her in this connection is sure of her hearty co-operation. Children hate to have knowledge crammed into their systems, but it is surprising how much knowledge they will pick up if there is an inducement connected with it. This Evans realized in inviting the school children to cut out the advertisements, which appeared every Tuesday and Saturday. The children were then told to color the flags with crayon or paint and they would soon have a full collection of the flags of our Allies. This stunt might be improved upon by offering prizes for the best colored flags.

The Live and Let Live Store, Chattanooga, Tenn., knowing how children worship their war idols, offered a photograph, size 15 by 18 in., of President Wilson or General Pershing with every purchase amounting to $2.

It will always pay the electrical dealer to take the children into consideration for, in addition to affording a valuable medium of gaining immediate publicity, it assures the future growth of the store. For the child will be grown up some day and the favorable opinion thus formed of a merchant while the child is in the impressive age, will remain long after it is old enough to utilize its own judgment of things.

PREPARING FOR THE AUGUST CLEARANCE SALE.

August has been generally accepted by the electrical retail trade as the "clearance sale" month, when the wideawake electrical dealer cleans out his slow-moving stock. Several valuable suggestions for the preparation and conduct of such a sale were given in an article in the Monthly Sales Service of the Society for Electrical Development recently.

Before starting a sale of this kind the merchant should carefully analyze his stock to determine what goods were moving too slowly and must therefore be sold, and also the reason in order that he may avoid such difficulties in the future. After selecting the goods to be sold at reduced sale prices he should choose a suitable name for his sale. "Clearance Sale" alone has some advantages but its value may be considerably increased by the addition of some other word, such as "Electrical" or "Combination," while a distinctive name, such as "Red Letter Sale" or others commonly employed by department stores is even better. This name should be featured in all the dealer's advertising during the month and special pains should be taken to keep up interest in the sale by always featuring some especially attractive article.

In pricing the goods it should be remembered that they have no value as long as they remain on the shelves and that their sales possibilities grow less every day. For this reason the prices should be made low enough to insure their sale. But the selling price should never be reduced without giving some reason for otherwise the customers will think that the prices were too high in the first place.

New Appliances

Oil Filter for Screening, Clarifying and Filtering Oil—Triple Die Stock for Facilitating Pipe and Conduit Work

The Electrically Heated Simplex Oil Filter.

The bearings of electrical and other rotating, reciprocating and oscillating machinery must be thoroughly lubricated to minimize friction. Oil used for this lubrication should be frequently filtered and cleaned of sediment or other impurities if it is to be used over and over again, as is now customary for economy. Removal of the particles of metal, dirt, etc., maintains the oil at its best lubricating quality and prevents cutting of the bearings and thus reduces friction.

Oil is also extensively used in electrical apparatus, such as transformers, oil switches and circuit-breakers, etc., for its insulating and heat-dissipating properties. Such oil should also be frequently filtered and purified, if it is to retain its dielectric quality at a reasonably high value.

Electrically Heated "Famous" Oil Filter, Which Screens, Clarifies and Filters Oil for Reuse.

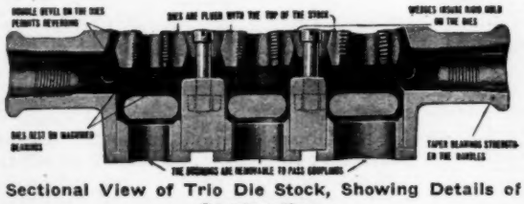
In the accompanying illustration is shown an oil filter designed especially for treating oil used for lubrication. It is also useful, however, for filtering oil for electrical purposes. It is known as the electrically heated simplex type of the "Famous" oil filter manufactured by the Famous Filter Co., 116 Pine street, St. Louis, Mo.

Operation of this filter is very simple. The dirty oil is poured into the removable screening compartment and percolates through the strainer wall and screening material. This thoroughly screened oil then descends through the feed pipe and spreading tee and enters into the clarifying chamber, near the bottom thereof at the left-hand side. As this chamber is always full of the oil which is undergoing the clarifying process, filtration takes place only after the oil level reaches the top of the clean oil reservoir, thus every drop of the oil must take its course and gradually travel upward and across to the other side during the clarifying process, so that all heavier particles of impurities and entrained water are separated from the oil and precipitated upon this chamber, whence they are withdrawn, occasionally, through the water and dirt drain valve at lower left side.

From the upper right-hand side of the clarifying chamber the oil passes into the filtering receptacle in the middle and filters through this dense filtering cloth, finally flowing into the clean oil reservoir, whence it is delivered as a high-grade oil at the clean oil valve shown in the lower right corner. By this process of first screening and clarifying the oil the cloth has to remove merely the few lighter impurities as only the cleanest oil filters through the exceedingly large area of washable high-grade filtering cloth surface presented by the patent self-contained and easily removable, double filtering-wall tension-truss receptacle.

It has been found that clarification or precipitation of particles in the oil is considerably facilitated by having it moderately warm as this increases its fluidity. For this purpose in the type illustrated there is provided an electric heating jacket that can be operated on either 125 or 250 volts, taking only 60 watts per gallon of oil reclaimed in either case. For 125 volts the two valves of this element are connected in parallel and for 250 volts they are connected in series. Since this heating coil is in the form of a solenoid, it possesses considerable magnetic properties causing particles of iron to be withdrawn from the oil more readily and completely than by slow gravity precipitation alone.

Trio Die Stock Complete.



Sectional View of Trio Die Stock, Showing Details of Construction.

Trio Die Stocks for Conduit Work.

Among the pipe tools which have been gaining in prominence until they have finally assumed the position as leaders in their line are the Trio die stocks, manufactured by the Greenfield Tap & Die Corp., Greenfield, Mass. This rise to prominence is due in a great measure to their excellent work during the war, when results were imperative.

The Trio die stock, as its name implies, contains dies and bushings for threading three sizes of pipe, all mounted in a single stock. This tool is therefore unique in the conduit and pipe-threading field. It is always ready to thread any one of its three sizes without any change or adjustment of any kind.

The next important feature of the Trio die stocks is that they are fitted with the well-known "Little Giant" pipe dies. These dies are made with a double bevel, a patented feature which permits the dies being reversed. This makes it possible to thread pipe projecting only a short distance up to a shoulder. By reversing the dies, the throat or chamfer is turned out. Adjustment of the dies is possible, as they are of the two-piece type and can be set to cut either exact or undersize by means of the set screws at each end of the die halves.

The simplicity of this tool, combined with its compactness, makes it extremely easy to use, and the fact that it accomplishes its work with a minimum of effort proves that its design is fundamentally correct. That this tool was designed with the user constantly in mind is evidenced by the choice of sizes included in the various models, there being one model with three sizes which are of extreme usefulness to the plumber and another with three sizes which are used continually by the electrician. The complete tool is surprisingly light in weight and can easily be carried in a kit bag by simply removing the handles.

The bushing guides used in this stock are so arranged that it is practically impossible to start anything but a straight, true thread and these guides, being removable, make possible the threading of nipples.

The manner in which the dies are held in place is worthy of notice as the well known three-angle principle is made use of. The dies bottom on a ground surface and are held absolutely rigid against the beveled side locating surface by wedges having bevels of the same angle as the side bevels on the die. Extremely accurate adjustments are possible as all the surfaces of the stock against which dies rest are machined.

Lately Approved Appliances

Underwriters' Laboratories, established and maintained by the National Board of Fire Underwriters (for service—not profit), have examined, tested and listed these electrical appliances in accordance with the Laboratories' Code for Construction and Test of Electrical Appliances. Copies of complete lists of standard appliances may be obtained from local inspection departments or from offices of the Laboratories in the principal cities.

Armored Cable.—The Pratt-Chuck Co., Frankfort, N. Y.
Marking: Blue paper cord between wire and armor.
Listed June 30, 1919.

Attachment Plugs, Fuseless.—The Chelten Electric Co., 4859 Stenton avenue, Philadelphia, Pa.
Separable attachment plugs having composition bases and plain or brass-covered composition caps.
660 watts, 250 volts, Catalog No. 2500.
Listed June 5, 1919.

Autostarters. — The Electric Controller & Manufacturing Co., Cleveland, Ohio.
Automatically operated, oil-immersed switch and transformer mounted as unit in metal case, with no-voltage release coil and either with or without overload protective panel.
In "off" position motor windings are disconnected from line. Separate switches are required to disconnect line wires.
Capacities, 150 hp. or less, 550 volts or less.
Listed May 21, 1919.

Cabinets and Cutout Boxes, Sheet-Metal. — Large-Dail Manufacturing Co., 114 North 13th street, Philadelphia, Pa.
Listed June 23, 1919.

Cabinets and Cutout Boxes, Sheet-Metal.—Massachusetts Electric Co., 18 Grafton street, Worcester, Mass.
Listed June 13, 1919.

Conduit Boxes.—Appleton Electric Co., 212-14 North Jefferson street, Chicago, Ill.
"Unilets." Pressed steel. Series FSP, FSW, Y, Z.
Note: These boxes, if not entirely exposed, must be securely fastened in place independently of support afforded by conduit. In all cases covers and attachments must be exposed and easily removable.
Listed June 14, 1919.

Conduit Boxes. — Cameron Overbagh & Co., 231 North Wells street, Chicago, Ill.
Listed June 24, 1919.

Conduit Boxes, Fittings for—Covers.—Cameron Overbagh & Co., 231 North Wells street, Chicago, Ill.
Catalog Nos. 312, 313, 400, 412, 413, 418.
Listed June 24, 1919.

Cutout Bases, Plug-Fuse.—Metropolitan Engineering Co., 1250 Atlantic avenue, Brooklyn, N. Y.
Combination service and meter-testing cutout bases, designed to facilitate meter testing.
M. E. Co., 0-30 amperes, 125 volts. Catalog No. 952 with wire conduit connectors, Catalog Nos. 9250-59 inclusive.
Listed June 3, 1919.

Cutout Bases, Plug-Fuse.—The Arrow Electric Co., Hartford, Conn.
"Arrow E." 0-30 amperes, 125 volts. Catalog Nos. 8020, 8042, 61935, 62135, 62165, 62199, 62569, 62587, 62965.
Listed July 1, 1919.

Electromechanical Gongs. — W. R. Ostrander & Co., 371 Broadway, New York, N. Y.
"Ostrander." Electromechanical gongs for fire-alarm or other signal circuits, 125 volts or less. Normal operating current 100 milliamperes.
Listed May 4, 1919.

Fixtures.—R. R. Cosby Electric & Machine Co., 1705 East Broad street, Richmond, Va.
Listed May 21, 1919.

Panelboards.—Massachusetts Electric Co., 18 Grafton street, Worcester, Mass.
Consisting of assembly of busbars, with or without cutout parts or with or without standard switches, mounted on insulating bases. Designed for use on low-potential circuits.
Listed June 13, 1919.

Receptacles for Attachment Plugs, and Plugs.—The Hart Manufacturing Co., Hartford, Conn.
"Diamond "H." 7½ amperes, 250 volts, 15 amperes, 125 volts. Catalog No. 1650.
Listed June 12, 1919.

Receptacle for Attachment Plugs, and Plugs.—V. V. Fittings Co., 1910 North 6th street, Philadelphia, Pa.
"V. V." 10 amperes, 250 volts, Catalog No. 43-H.
Listed March 31, 1919.

Sockets, Medium-Base.—Despard & Gordon Co., Chicago, Ill.
"Levolier." Metal Shell.
Pull, 660 watts, 250 volts, Catalog Nos. 1, 2, 3.
Listed June 19, 1919.

Switches, Knife. — Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
"Westinghouse." Motor-starting knife switches, 30-60 amperes, 250 volts or 500 volts alternating current, 30 amperes, 600 volts, Type A.
30-60 amperes, 250 volts or 500 volts alternating current, and 100 amperes, 250 volts, Type C.
Listed April 25, 1919.

Switches, Push and Rotary Flush.—General Electric Co., Schenectady, N. Y.
Two-circuit, Catalog No. GE637.
Three-circuit, Catalog No. GE638.
Listed Jan. 30, 1919.

Transformers, Lighting.—Western Transformer Co., 329 East 18th street, Oakland, Cal.
"W. T. C." Air-cooled indoor transformers designed to supply current at following voltages to incandescent lamps for sign or house lighting. For use only when installed and wired in both primary and secondary circuits in accordance with Class C rules, National Electrical Code.
60 cycles, 1500 volt-amperes. Autotransformers 220-110 volts.
Listed April 5, 1919.

Wire Connectors. — Walger Connector Co., Bolton, Ont., Canada.
Wire connectors consisting of metal terminal plate with binding screws enclosed in molded insulating composition sleeve having threaded cap of same material. Straight Type S and three-way Types A and C. For use in joining wires of No. 12 B. & S. gauge or smaller, where such joints are accessible for inspection at all times. "Walger."
Listed April 26, 1919.

Wire, Rubber-Covered. — Astoria Wire Co., Astoria, N. Y.
Marking: One red and one yellow thread parallel to and between insulation and braid.
Listed July 2, 1919.

Wires-Miscellaneous.—Belden Manufacturing Co., 23rd street and Western avenue, Chicago, Ill.
Pendent cord composed of two conductors, each of which is made up of stranded copper conductor of No. 18, 16 or 14 B. & S. gauge, insulated with cotton wrap, wall of rubber with asbestos covering. Conductors are twisted and provided with rubber reenforcement or filler to give round exterior and provided with outer braid of cotton.
Marking: Blue and yellow threads laid parallel with wire between rubber insulation and braid.
Listed May 23, 1919.

Wires, Slow-Burning. — Marlin-Rockwell Corp., Insulated Wire Division, New Haven, Conn.
Fixture wire consisting of stranded conductors, having felted asbestos insulation. This wire is furnished in single conductor with or without outer silk or glazed cotton braid and in twisted pair or twin wire with outer silk or glazed cotton braid. For use in fixtures within buildings, including fixtures for gas-filled incandescent lamps. "Rockbestos." Nos. 14, 16 and 18 B. & S. gauge.
Listed March 12, 1919.

Trade Activities

Tri-State Electrical Supplies Organized — New Branch Offices Opened by Manufacturers — Literature Distributed

Beaver Electric Co., Portland, Ore., has purchased the electric fixture business of the Kingery & Marrs Fixture Co., and is greatly enlarging that feature of its activities.

Burgess Battery Co., Madison, Wis., is establishing a branch at Winnipeg, to manufacture dry cells, flashlights and cases for its Canadian market, which has been growing rapidly. This new branch is being incorporated as the Burgess Batteries, Ltd., under Canadian laws, but it will be closely allied with the Madison organization through officers and engineering and sales departments. The manager is L. R. Baker of Winnipeg.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has just recently issued quite an elaborate publication covering the process of electric arc welding and the necessary apparatus required for this process. This publication compares the different processes of welding, such as autogenous welding, forge welding, oxy-acetylene welding, thermit welding and shows the advantages of electric arc welding over these. Some of the advantages of electric arc welding shown are: Economy, ease and convenience of application, speed of operation, reliability of results, reclaiming defective material, safety, conservation of material, and less skilled labor required. The field for electric arc welding is unlimited and the process has made enormous strides during the last few years until now it is widely used throughout those branches of the metal industry in which work is done on iron or steel in rolled, cast or fabricated forms. New fields for its successful application are being discovered every day.

The Electric Auto-Lite Corp., Toledo, Ohio, has opened a new branch of its business at 221 Cherry street. This will be known as the Willys-Light division of the company and will market a home lighting plant for districts not supplied with current. At the sales room is a section fitted up in the fashion of a country home, which is fully electrified and modernized by the home power plant, and is as convenient and fully equipped as if it were located in a metropolitan community. This plant, which occupies 8 sq. ft. of floor space, will provide power to light a home, supply water pressure and operate such home electrical appliances as flatirons, percolators, washing machines and vacuum cleaners. It is estimated that 15,000,000 American homes are lighted by means other than electricity, and of these 6,000,000 are the homes of farmers. It is in districts not supplied with current that the corporation expects an especial demand. Distributing agencies for the plant will be located in some 20 cities.

Page Steel & Wire Co. has opened a branch office in Chicago, at 29 South LaSalle street. This office will handle all Armco iron products, including Armco welding rods, twisted pairs, plain and galvanized strand, bond wires, Armco iron fence and barbed wire and other brands of fence wire manufactured by the Page Steel & Wire Co. This company has opened another new branch office in the Book building, Detroit. Distribution in Canada is in the hands of Taylor & Arnold, Ltd., Montreal, Toronto, Winnipeg. Local distributers for Armco iron welding rods are located in all principal industrial centers. The sales of the Armco iron department are under the supervision of W. T. Kyle, sales manager, at 30 Church St., New York.

Vulcan Soot Cleaner Co., DuBois, Pa., has just published Bulletin 541, which illustrates and describes the Vulcan patented diagonal method for cleaning soot from the tubes of horizontal water-tube boilers. It embraces the following features: Thorough cleaning efficiency, long life, low maintenance cost, accessibility for inspection and repairs, ease of installation without interference with present boiler equipment and low first cost. Illustrations in two colors show typical designs as applied to horizontal water-tube boilers with vertical baffling. This bulletin also contains a discussion entitled "The Cost of Vulcan Cleaners and an Analysis of Their Value as Investments." This publication is free upon request.

Tri-State Electrical Supplies Co., Sioux Falls, S. D., is the name of a recently organized firm with an authorized capitalization of $250,000. Plans of the company contemplate making Sioux Falls the distributing point for electrical equipment of all kinds in the vast territory including South Dakota, Iowa and Minnesota. G. Denton is president and manager of the new organization. Associated with Mr. Denton as officers are N. C. Draper, formerly of the Northern States Power Co., as vice-president and electrical engineer; John C. Farley, secretary, and Miss M. E. Barrick, assistant secretary and treasurer. Mr. Denton will have executive charge of the business of the company, while Mr. Draper, who is an electrical engineer of long experience, will have charge of the sales department. It will handle construction material and manufactured electrical articles on a strictly wholesale basis. Electrical products, including motors, generators, telephone supplies, plant equipment and a wide range of electrical household appliances. A large modern warehouse will be erected, with trackage facilities for handling the enormous stocks that will be maintained.

The Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has recently opened an office in Detroit, located at 905 Kresge building, to expedite the handling of orders and to give the company's customers in and about Detroit better engineering service. The Detroit office is, in reality, a branch of the Chicago office and bears the same relation to it as the Cincinnati office. H. S. Kinsley, who is in charge at Detroit, has taken with him from the Chicago office Messrs. C. W. Greenman and M. Dugliss, both of whom were recently mustered out of service. This trio will form the nucleus for the Detroit organization. Prior to going to Chicago, several years ago, Mr. Kinsley was connected with the engineering department at the Milwaukee plant.

The Trumbull Electric Manufacturing Co., Plainville, Conn., announces that the General Electric Co. has acquired a financial interest in the company, which, however, entails no change whatever in the present management, or personnel of the company. It will be the policy of the company to sell its material through the same distributers as in the past and on the same basis as to terms, price and service. The business of the Trumbull Electric Manufacturing Co., will be carried on in the future exactly as in the past in every particular. Work has been started on a new factory for the manufacturing of safety switches, which will increase the floor space of the plant about 33⅓%. This addition was made necessary by the rapidly growing demand for Trumbull safety switches, and the entire new building will be devoted to the production of this one line.

Marron Manufacturing Co., Rock Island, Ill., has brought suit for injunction against the Phelps Motor Co., of the same city, to restrain it from forfeiting a contract entered into between the two companies on Sept. 5, 1918, in which the selling of complete farm lighting lamps manufactured and assembled by the defendant was placed exclusively in the hands of the complainant. In entering into the contract the Marron company disposed of its previous rights in the manufacture of electrical apparatus used in connection with the complete lighting lamp, and turned this over to the Phelps company under the conditions cited. The complainant charges that the Phelps company has been violating the contract by selling and installing complete plants. A further feature of the contract was that the Marron company would take over the Phelps company at an agreed price in case the latter was unable to manufacture and deliver engines in certain quantities. This the Marron company is ready to do.

Current News

Weekly Record of Construction Activities—Conventions

EASTERN STATES.

Wellesley Hills, Mass.—The Academy of Assumption, Oakland street, is planning for the construction of a boiler plant at the institution. With mechanical laundry plant to be installed, the work is estimated to cost about $50,000.

Wallingford, Conn. — Plans and specifications are being prepared for the installation of an additional 250-hp. boiler purchased nearly two years ago by the municipal electric light plant. Installation and piping, contract for which has not yet been awarded, will cost approximately $13,000. A. L. Pierce, engineer.

Providence, R. I.—A hydroelectric power plant to cost about $80,000, will be erected by the Nightingale-Morse Mills at their branch works at Putnam, Conn.

Brooklyn, N. Y.—Julius Kayser & Co., 45 East 17th street, New York, are making rapid progress on the construction of the large new power house at their plant on Classon street, Brooklyn, and it is expected that the work will be completed at an early date.

Brooklyn, N. Y.—Work has been practically completed by the Transit Development Co., 24 Broad street, New York, on the construction of the new addition to its power plant and electrical gallery on Kent avenue, near Wallabout Canal, Brooklyn, and it is expected that operation will be inaugurated at an early date.

Long Island City, N. Y.—In connection with the construction of the proposed four-story addition to the local plant of the Patterson Sargent Co., 8 Jay street, New York, estimated to cost about $300,000, large quantities of electrical equipment for operation will be required. Final contracts for the proposed structure have been awarded.

New York, N. Y.—Edwards & Co., Inc., manufacturer of electrical equipment, alarms, etc., with works at Exterior and 140th streets, has filed plans for alterations and extensions in its five-story factory to increase the present capacity. The work will cost about $40,000.

New York, N. Y.—American Precision Works, manufacturer of electrical, surgical and dental instruments, plans to remove its works to one of the suburbs of New York, where it will increase its manufacturing schedule and take up the production of instruments and apparatus for other industrial purposes. K. G. Frank is president.

New York, N. Y.—Loriam W. Young has leased the entire building at 214 East 40th street, and will establish a new works for the manufacture of electric lighting fixtures.

New York, N. Y.—In connection with its note issue of $6,000,000, to be used for the plant extension and improvements, the Sloss-Sheffield Steel & Iron Co., 56 Liberty street, is planning for the erection of a large central electric power plant. The new station will be used for service at its ore and coal mines, which are to be electrified.

Niagara Falls, N. Y.—Niagara Falls Gas & Electric Co. is planning for the erection of a new plant, to consist of seven buildings at Buffalo avenue and 22nd street, to cost about $200,000. A. H. Merritt is superintendent.

Persia, N. Y.—Application has been filed with the Public Service Commission by the Iroquois Utilities, Inc., for permission to make extensions and improvements in its electric plant and system in Persia and Leon, Cattaraugus county.

Poughkeepsie, N. Y. — Smith Brothers, North Hamilton street, are having revised plans prepared for the construction of the proposed industrial plant to be located at Michigan City, Ind. The works will comprise main manufacturing building, three-stories in height, with large power plant for general works operation, the project being estimated to cost $150,000.

Westfield, N. Y.—Armour & Co., Chicago, Ill., are making rapid progress on the construction of their two-story local plant and power house, about 200x1170 ft., and it is expected that operations will be inaugurated at an early date. The new plant when completed will cost about $300,000.

Boonton, N. J.—Boonton Electric Co. is arranging a new contract with the city officials for furnishing light and power service, including street lighting, for three years, commencing January 1, 1920, at present rates.

Dover, N. J.—New Jersey Power & Light Co. is making efforts to complete its new transmission line to Newton at the earliest date. Increased service is to be supplied at this point. The company has commenced the installation of new street lighting systems at Ledgewood, Succasunna and Kenvil. It is proposed to have the systems ready for operation early in October.

Newark, N. J. — Modern Electric Co., 518 South 19th street, has filed notice of organization to operate an electrical engineering and contracting business. Abraham Reichenstein, 347 South 12th street, heads the company.

Allentown, Pa.—To offset the construction of the proposed municipal electric power plant as now contemplated by the city, the Electric Light & Power Co. has tendered an offer to the city for a reduced schedule of charges. The company proposes a ten-year contract, which provides for the installation of 250-watt incandescent lamps to replace the present arc lamps. The new charge would be $38,886 as against the present schedule aggregating $49,300.

Carlisle, Pa. — An electric power plant, 30x94 ft., will be erected by C. H. Masland & Sons, Amber and Westmoreland streets, Philadelphia, in connection with their proposed carpet manufacturing plant on the former fair grounds at Carlisle. Bids for the building are now being asked.

Catasauqua, Pa.—The Town Council is having surveys made of the present street lighting system to devise plans for extensions and improvements. It is planned to install a modern system of lighting system, covering a total of about 43,275 cp. throughout the city. John A. Wise, President of the Eastern Pennsylvania Securities Co., is co-operating with the city in connection with the work.

Hershey, Pa. — An electric power plant, 13x140 ft., will be erected by the Hershey Chocolate Co. in connection with the proposed addition to its local plant to cost about $500,000.

Philadelphia, Pa.—The Hospital for Women, 4035 Parrish street, has filed plans for alterations and extensions in the power plant at the institution.

Pittsburgh, Pa. — Vetter Manufacturing Co., manufacturer of electrical specialties, has leased a seven-story brick building at 424-8 Second avenue, corner of Cherry Way, for new works.

Shamokin, Pa. — Susquehanna Collieries Co. is planning for extensions and improvements at its various plants to cost about $4,000,000. Considerable electrical and mechanical equipment will be installed for greater efficiency in operation. The company's properties are known as the Richards, Pennsylvania, Scott, Hickory Ridge, Hickory Swamp, Luke Fidler and Cameron Collieries. A new coal breaker will be constructed.

Shenandoah, Pa.—The City Council has had plans prepared for the erection of a new one-story electric pumping plant for municipal service to cost about $30,000.

Wilkes-Barre, Pa.—Acheson Bread Co., Main street, will build an addition to its boiler plant to cost about $10,000. Frank H. McCafferty is manager.

York Haven, Pa. — York Haven Water & Power Co., will soon commence the construction of a new transmission line to connect with the

system of the Reading Power Co., at Annville, Lebanon County. Surveys for the line have been completed. The Reading company will extend its present line from Lebanon to Annville, to make the connection. The two power companies have also arranged for a tie in with other power companies operating at Philadelphia, Pottsville and Allentown. The York Haven company plans to connect with neighboring lines as well with its Middletown system.

Baltimore, Md.—Cambridge Iron & Metal Co., 2032 Aliceanna street, will install 50-hp. in motors.

Charleston, W. Va.—A new electric power plant, 40x60 ft., for works operation will be erected by the Virginia Rubber Co. in connection with its proposed new rubber manufacturing plant. The company was recently incorporated with a capital of $1,200,000. A. A. Lilly is president, and Houston G. Young, vice-president.

Wheeling, W. Va.—West Virginia Traction & Electric Co. has closed a contract with the Elkins Coal & Coke Co. for furnishing electric power for operation at its properties in Monongalia and Preston counties. The company plans for the complete electrification of its plants in every department of operation.

Lockhart, S. C.—Lockhart Power Co. is planning for the erection of a new hydroelectric power plant on Broad river. The structure will be 36x100 ft. reinforced concrete. Enslie Nicholson, president.

Orangeburg, S. C.—The City Council is planning for extensions in the local electric power plant to increase the present capacity. The work is estimated to cost about $70,000. E. Hawes is city engineer.

Hayesville, N. C.—Public Service Co. recently incorporated with a capital of $125,000, has acquired a local hydroelectric power plant to be used as its initial station. It is planned to build an addition to increase the present capacity, and to locate another hydroelectric plant on a water development on Shooting Creek. A six-mile transmission system will be constructed, with local distributing lines to furnish electric light and power throughout this vicinity. G. H. Haigler and W. J. Winchester head the company.

Pensacola, Fla.—A series of about 20 electrically operated centrifugal pumps will be installed by the Bruce Dry Dock Co., in connection with its proposed dry dock and ship repair plant. The plant is estimated to cost $450,000.

NORTH CENTRAL STATES.

Cleveland, Ohio — L. A. Sommer, 2934 East 55th street, Cleveland, will let contracts for a $75,000 power house. The building will be brick, steel and reinforced concrete construction, steam heating, plumbing, fireproof interior finish, motors, generators, pumps and boilers, and electric lighting.

New Concord, Ohio — $35,000 in bonds have been voted to purchase water and light plant.

DATES AHEAD.

National Council of Lighting Fixture Manufacturers. Midsummer convention, Cleveland, Ohio, Aug. 5 and 6. Secretary-treasurer, Charles H. Hofrichter, 8410 Lake avenue, Cleveland, Ohio.

Michigan Section, N. E. L. A. Annual convention, Ottawa Beach, Mich., Aug. 26-28. Headquarters, Hotel Ottawa. Secretary-treasurer, Herbert Silvester, Monroe, Mich.

Pennsylvania Electric Association. Annual convention, Bedford Springs, Pa., Sept. 3-6. Secretary, H. M. Stine, 211 Locust street, Harrisburg.

Washington State Association of Electrical Contractors and Dealers. Annual convention, Seattle, Sept. 11. Secretary, Forrest E. Smith, 205 Boston Block, Seattle.

Southeastern Section, N. E. L. A. Annual convention, Asheville, N. C., Sept. 17-19. Secretary-treasurer, T. W. Peters, Columbus, Ga.

New England Section, N. E. L. A. Annual convention, New London, Conn., Sept. 22-24. Headquarters, Hotel Griswold. Secretary, Miss O. A. Bursiel, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Annual convention, St. Louis, Mo., Sept. 22-26. Secretary, John F. Kelly, Empire building, Pittsburgh, Pa.

American Electrochemical Society. Fall meeting, Chicago, Sept. 23-26. Headquarters, Congress Hotel. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

International Association of Municipal Electricians. Annual convention, Chicago, Sept. 23-26. Secretary, Clarence R. George, Houston, Tex.

National Association of Electrical Inspectors. Annual meeting, Springfield, Mass., Oct. 13 and 14. Secretary, W. L. Smith, Concord, Mass.

Illuminating Engineering Society. Annual convention, Chicago, Ill., Oct. 20-23. General secretary, Clarence L. Law, 29 West 39th street, New York City.

Hammond, Ind.—Northern Indiana Gas & Electric Co. has petitioned the Public Service Commission for permission to issue notes for $1,067,000 with which it is intended to make extensions and improvements. S. B. Walters, 571 Holmes street.

Indianapolis, Ind.—Nordyke & Marmon Co. has taken out a permit for the erection of an assembly room for motors, one-story, brick and steel construction, 802x100 ft., to cost $90,000. This work is in addition to the proposed factory additions that are to cost $350,000.

Indianapolis, Ind. — Drew Electric & Manufacturing Co., manufacturer of overhead fixtures for electric trolley wire, has purchased a two-acre site at Collamer avenue, and the Nickel Plate Railroad, East Cleveland, Ohio, where it will shortly begin the erection of a plant, machine shop and brass foundry to cost $50,000. James H. Drew is president.

Michigan City, Ind.—Architect W. P. Field, 763 Broad street, Newark, has prepared plans and will let contracts for a $150,000 industrial and power plant to be erected at Michiga City by Smith Bros., North Hamilton street, Poughkeepsie, N. Y. The building will be of brick and concrete construction, steam heating, plumbing, fireproof interior finish, boilers and pumps, electric lighting.

Portland, Ind. — Negotiations are under way with the directors of the Union Traction Co. of Indiana, relative to the purchase of the power plant at Detamore and the water rights of the Cartwright stone quarry. Portland is in need of a better equipped power plant and the Detamore plant will answer that purpose. The consideration is about $20,000.

Ashton, Ill.—At a meeting of the Ashton council the members took up the question of lighting the streets with electricity and a representative of the Illinois Northern Utilities Co. was present at the request of the council to give them the neeessary information. The council finally decided to enter into contract with the utilities companies for a period of ten years for 50 lamps of the 100 cp.

Charleston, Ill. — Coles County Telephone & Telegraph Co. will place its cables underground in the business streets.

Chicago, Ill.—Holabird & Roche, 104 South Michigan avenue, have prepared plans and will let contracts for a $60,000 substation for the Commonwealth Edison Co., 72 W. Adams street, Chicago. The building will be brick construction, hot water heat, plumbing, fireproof interior finish, motors, generators and pumps.

Chicago, Ill. — Sears, Roebuck & Co. will erect a large warehouse at the northwest corner of Fillmore street and South Kostner avenue, adjacent to the B. & O. C. T. T. Railway. Plans are being prepared for the erection of a $400,000 paint factory. It will be a five-story structure to be used for the manufacture of paint and will be equipped with the most modern machinery.

Medora, Ill.—An election will be held on August 5 at Medora, to decide if $12,000 shall be issued to provide the village with an adequate lighting system. If the vote is to issue the bonds Medora will be connected with the Greenfield Service from Keokuk power.

Rockford, Ill.—Central Union Telephone Co. and the Rockford Home Telephone Co. have been consolidated by purchase of the latter by the Central Union Co.

Springfield, Ill.—Ira W. Fisk, consulting electrical engineer of New York, will assist in planning the additions and extensions to the electric plant which are to be made when the $400,000 bond issue is voted.

Urbana, Ill.—A street lighting system, ornamental in type, will be installed in the southwest part of the city, adjacent to the campus of the University of Illinois at a cost of $31,600. This is in addition to the installation of ornamental lights on West Green street at a cost of $6000.

Boyne Falls, Mich. — An election will be held to decide the question of issuing bonds to purchase electric pump for water system. Address village clerk.

Beloit, Wis. — City council has granted the street lighting committee permission to redraft plans for proposed ornamental lighting system in the business section. R. E. Wood, city clerk.

Fond du Lac, Wis.—Northern Basket Co. will erect a $75,000 factory, engine, boiler and power house, garage and warehouse.

Manitowoc, Wis.—The city will install electric lighting system on South 8th street. Arthur Zander, city clerk.

South Byron, Wis.—Plans are being prepared for the installation of an electric lighting system in South Byron. Electric energy for operating the system will be obtained from Kilbourne.

Fairmont, Minn. — The municipal electric plant, which has been operated for a number of years has discontinued the manufacture of electricity and is now purchasing its electric current from the Northern States Power Co., Sioux Falls, South Dakota division.

St. Paul, Minn.—Three new warehouses to cost $300,000, $400,000 and $350,000 respectively, a $200,000 paper box factory and a $500,000 candy factory are to be additions to St. Paul industrial activities some time during the ensuing year. Building permits during the first six months of 1919 total $4,318,000, almost equaling the total valuation of buildings actually erected in 1918.

Davenport, Iowa—Property owners on Perry street, between 2nd and 3rd streets, contemplate installation of ornamental lamps. Cost $2500. Hugo Moeller, city clerk.

Davenport, Iowa—H. C. Kahl plans erection of a $1,000,000 office building and theater, to contain theater seating 2500 persons, 234 office suites and 12 store suites. The building will be 150x147½ ft.

Eldridge, Iowa—At a special meeting held, councilmen voted an extension of electric power from Davenport. Approximate cost $6000. Fritz Weise, city clerk.

Mason City, Iowa—Western Electric Telephone Co. has inaugurated an extensive improvement program over the northwestern part of the state in the neighborhood of $200,000. A copper circuit is one of the improvements, to be installed by the company, and will be of the latest type. The company will also make other improvements. Further improvements to be made in Mason City includes the installation of private switchboards in the First National Bank and in the offices of the Northwestern States Portland Cement Co.

Ottumwa, Iowa—In a recent week the new business department of the Ottumwa Railway & Light Co., in conjunction with the local electric dealers, took orders for wiring 18 already built houses and disposed of 31 household appliances.

Chanute, Kans.—The council will secure an engineer to prepare estimates for a municipal light plant. Aug. 5 the question of issuing $75,000 will be submitted to vote. C. G. Wood, city clerk.

Harper, Kans.—Plans are in progress by W. B. Collins, Railway Exchange building, Kansas City, Mo., for waterworks improvements to cost $35,000. The work will include pumping equipment, engine and generator and pipelines.

Hugoton, Kans.—A new electric and water plant is being contemplated.

Manhattan, Kans.—Plans for the new electric light and power plant to be erected opposite the old plant have been drawn and the cost has been estimated at $500,000.

Winfield, Kans.—Bids will be advertised in the near future for improvements to the municipal light and power plant, including a 1000-kw. turbogenerator and auxiliaries at a cost of $45,000.

Lincoln, Neb.—The voters of the city of Lincoln will decide at a special election upon the purchase of the Lincoln Street Car Co. If the city takes over the lines it is the intention to create a new department with an expert on street car business at the head.

Towner, N. D.—At a regular meeting of the city council a committee was appointed to investigate the condition of the lighting service now existing and also to secure advice regarding the cost of installing a more modern lighting plant in connection with the city water system.

Gregory, S. D.—The question of issuing $122,000 municipal light bonds will be submitted to vote. Address city clerk.

Sioux Falls, S. D.—Building permits were issued to the Northern States Power Co. for brick and steel power plant on west side of Weber avenue. $7000.

SOUTH CENTRAL STATES

Louisville, Ky.—Fifty-one new electric light and power customers were secured by the commercial department of the Louisville Gas & Electric Co. during the week ending July 12 with 20 kw. of lighting load and 135 hp. in motors. Contracts were also taken for wiring 13 already built houses. The net connected load gain for the week was 33 customers with 7 kw. of lighting and 20 hp. in motors. Electric energy output for the week was 20.4% greater than for the corresponding week last year.

Mayking, Ky.—Mayking Coal Co. is considering the erection of an electric power plant at its properties for works operation.

Wolf Pit, Ky.—McKinney Steel Co. is planning for the construction of a new electric power plant at its works to cost about $60,000.

Centreville, Tenn.—An election was held to vote $12,000 bonds for the purpose of erecting a light plant for the town.

Ada, Okla.—Election will be held soon to vote $500,000 in bonds for waterworks extensions and storm sewers. Johnson & Benham, consulting engineers, Firestone building, Kansas City, Mo.

Broken Bow, Okla. — Election to vote $100,000 in bonds for waterworks and $30,000 for sanitary sewers, carried.

Enid, Okla.—Five hundred electric fans have been placed on the lines of the Enid Division of the Oklahoma Gas & Electric Co. so far this season. One dealer alone reports the sale of 200 electric fans. The Arctic Ice & Refrigerator Co. is installing 55 hp. additional motors which load is served by the Enid Division.

Hobart, Okla.—V. V. Long, consulting engineer, has been chosen to prepare plans and estimates for a new electric light and water plant. On submission of the plans, an election will be called to vote on the proposition.

Madill, Okla.—Johnson & Benham, Firestone building, Kansas City, Mo., are preparing plans for waterworks improvements to cost $60,000.

Tonkawa, Okla.—Election will be called soon to vote approximately $117,000 in bonds for waterworks and light extensions. Johnson & Benham, Kansas City, Mo., engineers.

Breckenridge, Tex.—J. E. Lewis of Dallas and associates have purchased the electric light and power plant here from Bert Paschall. New machinery will be installed and the capacity of the plant largely increased.

Eastland, Tex.—The electric light and power plant of the Eastland Light & Power Co. is to be enlarged to five times its present capacity in order to meet the growing demand for light and power, due to the remarkable growth of the town since oil was discovered here. The company plans to construct a system of electric power transmission lines through the oil field.

Hearne, Tex.—The capacity of the municipal electric light and water works plants here is to be enlarged by the installation of new machinery and equipment.

Houston, Tex.—Houston Light & Power Co. has arranged for a bond issue of $483,000 for proposed extensions and betterments. The company plans for the installation of a new 10,000-hp. turbogenerator, with auxiliary operating equipment at its plant, and for extensions in its transmission and distributing system. Samuel H. Bertron is general manager.

Kingsbury, Tex. — Arrangements are being made for the installation of a public lighting and water system.

Orange, Tex.—Orange Ice, Light & Water Co. has amended its charter, increasing its capital stock from $60,000 to $100,000. It will enlarge its electric light and power plant.

Waco, Tex.—Election will be held on Aug. 12 to vote on the proposition of a municipal gas and electric plant.

WESTERN STATES.

Ronan, Mont. — Flathead Valley Electric Co. will install several electric light and power plants in the Flathead Valley. Andrew Anderson, Plains, Mont., is president.

Bend, Ore.—Preliminary engineering work for the construction of an 1800 hp. plant on the Tumalo at the Columbia Southern ditch has been started by the Bend Water, Light & Power Co. The estimated cost is $125,000. Power development on the Tumalo was made necessary when plans for building a 5000-hp. plant at Lava Falls were canceled by tying up

of all Deschutes water rights for irrigation.

Portland, Ore.—Extension of steam and electric mains planned and now under construction by the Northwestern Electric Co. will involve an expenditure of more than $100,000 according to G. C. Pierce, vice-president and general manager of the company.

Scofield, Ore. (P. O. Burton).—The Standard Box & Lumber Co. will rebuild its plant. The new plant is to be electrically operated.

Toledo, Ore. — The Fisher-Storey sawmill recently destroyed by fire is to be rebuilt on a much larger scale. It will be motor driven, power being supplied by a plant built at the mill.

Grand Mound, Wash. — NePage, McKenney & Co., Armour building, Seattle, have been awarded contract for electric wiring in cottage being erected at school for girls at this place by the State Board of Control at $2957.

Seattle, Wash.—Walter Lassen and R. D. Colman have opened an electric shop in Bremerton, Wash.

Seattle, Wash.—It is proposed in a council bill to issue and sell $1,250,000 utility bonds for the construction and equipment of third unit to the municipal steam plant on Lake Union of approximately 12,500-kw. capacity.

Seattle, Wash.—An eight-bent concrete building 120 by 80 ft. with full basement, will house the new unit of the power plant to be erected at the Lake Union plant of the city. Plans are being prepared by City Archt. Daniel Huntington. Unit for which bonds have been authorized will cost $1,250,000.

Seattle, Wash. — County commissioners have granted a permit to the Pacific Coast Coal Co. for construction of an electric power transmission line from a point near Renton, along the Renton-Newcastle county road.

Tacoma, Wash.—Ground has been broken for construction of a rubber plant for the Western Rubber Co. which when completed will employ 150 persons.

Tacoma, Wash.—The city council has offered the Tacoma Railway & Power Co. $1,500,000 for its street car lines within the city, providing a vote of the people sanctions the purchase. Under the offer the railway company would also agree to finance a loan of $1,000,000 to the city for the purpose of putting the lines in first class condition. In the past the railway and power company has placed a valuation of $6,000,000 on its lines. The action of the council follows a recommendation of a committee of citizens appointed to consider the street railway problem. This committee decided that the lines would be unable to pay expenses under any fare that the people would stand.

Tacoma, Wash.—The City Council has announced a special election to authorize the purchase of the Lake Cushman power site and to issue $300,000 in bonds for construction.

Chico, Cal.—Preliminary steps have been taken toward the construction of a municipal electric system power generating plant. It is planned to erect a power plant in the canyon capable of generating 3000 hp. The construction of two plants will also be considered.

FOREIGN TRADE

[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]

Electrical Material (30,064). — The agency is desired by a man in France for the sale of electrical, sanitary and plumbing material. Correspondence should be in French. References.

Electrical Conductors (30,032).—A street railway company in Spain wishes to receive catalogs of materials such as rails, overhead construction and electrical conductors. Correspondence should be in Spanish.

Electrical Equipment (30,040). — A firm in England desires to act as agent for the sale of engineers' tools and electrical equipment. Quotations should be given f. o. b. American port or c. i. f. English port. Payment, cash against documents. Reference.

Electrical Appliances (30,069). — The purchase and agency is desired by a firm in Belgium for the sale of electrical appliances, such as switches and sockets, wrought iron and steel tubes and fittings, malleable-iron fittings, and gun metal and brass fittings for gas, water, and steam, copper and brass wire, sheets, bar rods, etc. Quotations should be given c. i. f. Antwerp. Correspondence may be in English, but catalogs should be in French if possible. References.

PROPOSALS

Electric Wiring.—Bids will be received by the Sisseton, S. D., Independent School District for the heating, plumbing and electric wiring including electric time program clock and fire alarm system. Frank F. McKenna, clerk.

Electric Light Plant—Bids will be received Aug. 8 for labor and materials required in the construction of an electric light plant for Beresford, S. D. The work is divided into three parts: part 1, brick and tile building; part 2, electric station equipment, consisting of furnishing and erecting two 120-hp. Diesel and semi-Diesel type oil engines, direct connected to two 100-kv-a. generators, also switchboard, constant current transformers, and part 3, pole line, consisting of furnishing and erecting poles, wires, transformers. Address Y. M. Yorker, city auditor.

Pumps—Bids will be opened Sept. 3 for both centrifugal and turbine type pumps to be installed in the pumping station, Kansas City, Kans. Plans and specifications are being prepared for a 50,000,000-gal. capacity pump.

INCORPORATIONS

Brooklyn, N. Y.—Eisenhut Storage Battery Co. Capital, $10,000. To manufacture storage batteries and other electrical products. Incorporators: O. F. and C. Eisenhut, and G. T. Egensteimer, 804 Seneca avenue.

Hadley, N. Y.—Hadley Light & Power Co. Capital, $25,000. To operate a local light and power plant. Incorporators: J. H. Smead, W. Fowler, and J. J. Breen, Hadley.

New York, N. Y.—Portable Electric Current Co. Capital, $2,000,000. To manufacture storage batteries and other electrical specialties. Incorporators: L. B. Kanter, W. A. Blank and C. B. Plante, 761 Lincoln place, Brooklyn.

New York, N. Y.—Mechanical Stokers Corp. Capital, $100,000. To manufacture stokers and other furnace appliances. Incorporators: H. H. Van Aken, M. C. Flanagan and G. B. Sleigh, 31 Nassau street, New York.

New York, N. Y.—Morison Electrical Supply Co. Active capital, $55,000. To manufacture electrical supplies. Incorporators: G. W. Harris, A. H. Abbott, and C. T. Morison, 515 West 187th street.

New York, N. Y.—Victory Engine Co. Capital, $50,000. To manufacture engines, motors, etc. Incorporators: C. O. Assmus, C. H. Atkins, and M. A. Farley, 28 Sterling place, Brooklyn.

Troy, N. Y.—Rensselaer Electrical Supply Co. Capital, $25,000. To manufacture electrical supplies. Incorporators: R. G. Finucane, C. F. W. Kaelber, and A. R. Page, Rochester.

Glenfield (Lewis County), N. Y.—Otter Creek Power Corp. Capital, $35,000. To operate a local power plant. Incorporators: H. S. Lewis, H. D. and G. L. Cornwall, Beaver Falls.

Newark, N. J. — Newark Motor Products Manufacturing Co. Capital, $100,000. To manufacture motors and other electrical products. Incorporators: Otto and H. J. Weber, and Albert J. Farmer.

Philadelphia, Pa.—Railways Electric Equipment Co. Capital, $2,000,000. Incorporated in Delaware to manufacture electric railway equipment and appliances. Incorporators: James F. Bohen, Henry McCarthy and Herbert W. Andrews, all of Philadelphia.

Seattle, Wash. — Seattle Electric Washer Co. has been incorporated by Thomas A. Gaynor et al., for $10,000.

Malone, Wis.—Malone Light & Power Co. has incorporated with a capital of $25,000, and will build an electric plant. John L. Beau, Frank Clark and others are interested.

Personal

Matthew S. Sloan New President of Brooklyn Edison — David C. Rosetahl Joins B & K Manufacturing—Changes

F. M. HAMILTON, superintendent of the department of accident investigation of the Puget Sound Traction Light & Power Co., Seattle, is making a business trip to Philadelphia.

E. J. MCILRAITH, formerly superintendent of ways and structures with the Puget Sound Traction Light & Power Co. at Seattle, has been appointed to the position of engineer in charge of maintenance with the Philadelphia Rapid Transit Co.

H. G. BAKER, for the past year connected with the new business department of the Western Colorado Power Co., Salt Lake City, a subsidiary of the Utah Power & Light Co., has resigned to become manager of the Clark Electric Co., with headquarters at Tooele, Utah.

S. L. SHUFFLETON, formerly chief of construction for Stone & Webster in the Seattle district, is now western manager for Stone & Webster at San Francisco. Leslie Coffin, formerly manager for the Puget Sound Traction Light & Power Co., at Bellingham, Washington, and who went to Hog Island for Stone & Webster, is now assistant western manager for Stone & Webster at San Francisco.

H. J. GILLE, sales manager, E. A. Batwell, publicity agent, and Capt. N. W. Brodkett of the legal department of the Puget Sound Traction Light & Power Co., have returned to Seattle from a meeting of the Pacific Coast Committeemen of the National Electric Light Association held at San Francisco for the purpose of arranging for the convention of the association to be held in Los Angeles next May.

MATTHEW S. SLOAN, who is at present operating manager of the New York Edison Company, has been elected president of the Brooklyn Edison Co. following the resignation of N. F. Brady from that office. Mr. Brady continues as chairman of the board and the executive committee. Mr. Sloan has been assistant to the president of the Birmingham Railway, Light & Power Co., and vice-president and general manager of the New Orleans Railway & Light Co.

A. E. KAISER, who for more than twenty-three years has been connected with the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has been appointed director of production. His experience with the company includes the paint department field and armature machining, winding, assembling, general foreman's offices, rate, central production and storekeeping departments. After spending three years in the latter department he was again called to the office of the works' manager for one year, after which he was appointed assistant director of production in 1912.

PROFESSOR A. P. LITTLE, formerly of the Bureau of Standards, who came to Yale University during the past year in connection with the Signal Corps Training School for officer candidates, has been appointed professor of electrical engineering in the Colorado School of Mines.

F. F. MCKINNEY has joined the copy staff of Brooke, Smith & French, Inc., advertising agents of Detroit. During the war he served as an ensign in the navy and since the armistice has been with the advertising department of the Cadillac Motor Car Co. Previous to his enlistment in the navy, Mr. McKinney was engaged in the newspaper business.

F. C. CHAMBERLAIN, for the past six years district engineer of electric operations for the properties of Henry L. Doherty & Co. in the western district, has been appointed general manager of the Richland Public Service Co., Mansfield, Ohio, succeeding R. E. Burger. Prior to his connection with the Doherty organization, Mr. Chamberlain was with the American Gas & Electric Co. at Wheeling, W. Va., and for about four years previous to that time he had been in the New York office.

DAVID C. ROSETAHL, formerly with the National X-Ray Reflector Co., New York City, has become associated with the B & K Manufacturing Co., New Britain, Conn., in the capacity of general sales manager of the portable lamp department. Mr. Rosetahl has been identified with the electrical fixture and portable lamp trade for the past 12 years, having represented such well known concerns as Sampson Bronze Co., J. B. McCoy Co., Sterling Bronze Co., of New York City. While in the employ of the National X-Ray company he acted as sales agent for the entire lower east side of New York City, where he met with great success in the distribution of lighting fixtures, portable lamps and National X-Ray reflectors, and his appointment as general manager of B & K company is a valuable addition to its staff.

STEPHEN C. POHE, who for the past year has been general manager of the Penn Public Service Co., Clearfield, Pa., is now vice-president of the operating companies controlled by the Pennsylvania Electric Co. of New York City, with offices at Clearfield, Somerset and Johnstown, Pa. Mr. Pohe will make his headquarters at Johnstown, where general offices of the companies have been established. He will direct the operating department of the system from that point. Mr. Pohe resigned as manager of the Columbia & Mountour Electric Co. and of the Northumberland Gas & Electric Co. at Bloomsburg, Pa., in 1918, to become general manager of the Penn Public Service Co., from which position he has been advanced. He has been prominently identified with the affairs of the Pennsylvania Electric Association, and was elected president of that organization in 1915.

Obituary.

NEAL KENT, for many years supply salesman for the Manhattan Electrical Supply Co., died recently at his home in Chicago. Mr. Kent was one of the best known and highly esteemed men of the industry in this section, and his sudden death came as a surprise to his many friends in the industry. He is survived by his widow and one daughter.

JOHN C. RODGERS, 75 years old, a prominet contractor of New York City, died on July 24 at his country home at New Rochelle, N. Y. Mr. Rodgers was engaged in the contracting business for forty years. He built portions of Riverside drive and the old subways in New York City, the West Shore Railroad and the Pennsylvania Railroad. He was the sole contractor for the La Chien Canal in Canada, the New York speedway, the Madison avenue bridge in New York City, and the Niagara Falls power tunnel.

LAVERNE W. NOYES, president of the Aermotor Co., Chicago, died on Thursday, July 24, after an illness of many weeks. He was widely known as an inventor and philanthropist. He was born at Genoa, N. Y., Jan. 7, 1849, and was graduated from the Iowa State College with a B. S. degree in 1872. In 1879 he moved to Chicago and patented a wire bookholder, of which he was the sole maker. In 1887 he invented several harvesting machines and later perfected the first steel windmill for the Aermotor Co., of which he was the head. In 1914 he patented the Auto-Oiled Aeromotor. He designed and built the first steel towers for windmills, and also introduced the first towers for electric transmission. The deceased is survived by an only sister.

JOSEPH WILLIAMS, treasurer of the New York Edison Co., whose home was at 440 Riverside Drive, died on July 23 at Santa Monica, Cal., where he went about July 1 to recover his health, which had been failing for about six months. Mr. Williams was born in New York City sixty-one years ago. In 1873 he entered the employ of Spencer Trask & Co., bankers. In 1890 Mr. Williams was elected assistant treasurer of the Edison Illuminating Co., of which Mr. Trask was president and which was Thomas A. Edison's first venture in electric lighting in New York City. Three years later he became treasurer. When the New York Edison Co. was established in 1901 Mr. Williams was elected assistant treasurer of that company and was elected treasurer in 1910.

For the Readjustment Period—What?

XLVII.

Today's Need — More Business

Today you are in business. Business gets slow. You lose customers. You see the stark, grim wolf of failure creeping 'round your corner, headed for your door. You must do more business.

Will you go and drag customers in? Will you travel 'round and tell your people of your plight and try to get them to patronize you out of pity? What chance do you stand against the punishing advertising of your competitors?

No chance at all—unless—and this is your only salvation—you advertise with them—advertise against them—or go to the wall!

You must race at their pace or you're out of the running.

And just as rocks and rifles enable a man to strike a harder blow than the impact of his fist or the kick of his boot—and at a far greater distance than the length of his arm—so consistent advertising enables a man to persuade more powerfully than by speaking to a few neighbors—enables him to reach untapped sources of patronage at wonderful distances—rather than depend upon precarious transient trade or pitying acquaintances.

Rifles are but perfected stone throwers. And advertising is the modern weapon—the rifle of big business. It is the better way and the only way to bring protection from and to bring down big game!

This little screed, which is copyrighted by the Press Publishing Co., has in it a thought or two of value for the progressive manufacturer or merchant. To meet the rising tide of expense "Doing More Business" is the only effectual safeguard.

C. A. TUPPER *President*
INTERNATIONAL TRADE PRESS, INC., CHICAGO

Financial News

Utility Securities Highly Desirable.

Samuel Crowther, in System Magazine, calls attention to the wisdom of investing present day surpluses in conservative securities. Sound public utility securities meet the requirements which he regards as highly desirable. He says:

"The ability of any individual or corporation to meet adverse conditions is measured by its financial resources that remain unaffected by the shifting conditions. If prices drop, inventory values will be cut, bookkeeping reserves be of almost no use, and any speculative bonds will be worse than useless because their value will vanish at the first storm cloud. The only resource which then can easily be liquidated will be the 'conservative' issues.

"There exists a rare opportunity today to build up a sound reserve. The so-called 'gilt-edged,' long-term, low-interest-bearing bonds are selling at high interest rates. It is unlikely that they can go very much lower. They can hardly be affected by any known business calamity and their value must increase with the shaking down of the years.

"They are the investment for a man who desires to be in business five or ten years from now when the world has resumed more or less normal functioning."

Federation of British Industries After World's Markets.

The Federation of British Industries, which is composed of over 900 of Britain's biggest manufacturers and manufacturing associations, has formulated plans for an overseas organization which contemplates the appointment in every market of the world of a commissioner, assisted where advisable by expert advisers and sub-commissioners. In this connection, the American Chamber of Commerce in London advises that the Federation has issued a map of the world which has been divided into 21 areas. Several of the commissioners for these areas have already been appointed.

Accompanying the map is a valuable analysis of the imports of the various commercial areas in 1913. The figures give the total imports and the amount of imports from the United Kingdom, thus showing clearly where British trade needs stimulating. It is the purpose of the Federation to explore all the possibilities of these markets and to further British trade in all possible ways.

The Oversea Trade Department of the Federation is a separate organization which is divided into eight geographical sections, organized as intelligence centers for the various territories. The purpose of this department is to provide a service run by manufacturers for manufacturers, capable of giving assistance and information of every kind promptly and efficiently to every manufacturer who desires to export his goods or import his raw material.

The American Chamber of Commerce in London says that the Federation of British Industries is a very high class, powerful organization and can be counted on as very likely to accomplish the objects it goes after.

Restoration of Public Utility Credit.

In view of the fact that President Wilson in his recent message to Congress called attention to the need of constructive action in regard to public utilites, and also that the newly organized Federal Electric Railways Commission is investigating the street railway situation with a view to making recommendations, an analysis of the public utility situation has been made by Stone & Webster of New York, Boston and Chicago.

"It is our belief that despite the difficulties of the war period there is a solid basis for optimism in the public utility situation," the analysis states. "The question of restoring public utility credit has become definitely recognized as one of the most important domestic matters to be solved during the coming period of readjustment. This credit must be reestablished on a basis that will insure to this great industry, representing an investment of $12,000,000,000, not only an adequate return on the capital already invested but also sufficient safeguards for the new capital that must continually be attracted so that utilities may serve in the growth of the nation.

"The service rendered in supplying light, power, gas and transportation in our cities and for our manufactories is as fundamental to the industrial and economic life of this country as are our railroads, mines, oil fields, agricultural lands and factories. It is estimated that the urban population served by street railways and interurbans is upwards of 43,000,000 and that they move over 20,000,000,000 passengers annually.

"Yet this great group of public service companies, serving national needs, shouldering all the higher costs of labor, taxes, materials and supplies occasioned by the war, received practically no financial aid from government sources and no assistance in a comprehensive plan for effective and speedy relief in the way of securing higher rates and fares—except as could be worked out by each individual company through the slow method of application to the state commissions, municipal authorities, and referendum vote.

"Capital had to be secured to take care of maturing obligations, amounting in 1918 to over $225,000,000, at interest rates in many instances much higher than the fixed rate of return allowed on the investment by franchises and other regulations, and with the temporary sacrifice in many cases of a large part of the equity value. In normal years the amount of new money required annually by public utilities for extension to plant aggregates from $600,000,000 to $700,000,000. During the period of the war these requirements were cut to approximately $250,000,000 per annum, but this money had to be raised in addition to the maturing obligations.

"For the year 1918 it was estimated that the net operating revenue of the traction companies in the United States approximated $70,000,000, with only a few months of the war labor board awards reflected in expenses. Increases in expenses through these awards amount to over $100,000,000 annually. Since we entered the war in 1917, and up to Feb. 1, 1919, companies operating some 4,900 miles of track, representing approximately one-tenth of the total street railway mileage, have gone into receivers' hands, that about 500 miles of track have been completely abandoned, and that foreclosure sales of twenty-three roads, representing 524 miles of track, have resulted."

Earnings Edmonton Public Utilities Show Improvement.

Edmonton public utilities show a net surplus for May of $2345, compared with a net deficit for the same month last year of $3549. The net surplus for the five months (inclusive of the street railway deficit) amounts to $62,233, against $33,809 for the corresponding period of 1918. Net surpluses for the five months of the respective departments are as follows:

	1919.	1918.
Electric light	$ 66,056	$54,131
Telephone	21,356	13,846
Water works	14,246	10,746
Total	$101,659	$78,724

The street railway deficit is $39,425, as compared with $44,914 last year, leaving, as already stated, a net surplus of $62,233 on the combined utilities, as compared with $33,809 in 1918.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities.	Div. rate. Per cent.	Bid July 22.	Bid July 29.
Adirondack Electric Power of Glens Falls, common	6	15	14
Adirondack Electric Power of Glens Falls, preferred	6	76	76
American Gas & Electric of New York, common	10+extra	130	130
American Gas & Electric of New York, preferred	6	41	41
American Light & Traction of New York, common	..	258	245
American Light & Traction of New York, preferred	6	98	97
American Power & Light of New York, common	4	65	65
American Power & Light of New York, preferred	6	73	65
American Public Utilities of Grand Rapids, common	..	10	10
American Public Utilities of Grand Rapids, preferred	7	35	32
American Telephone & Telegraph of New York	..	103⅝	103⅛
American Water Works & Elec. of New York, common	..	5	5½
American Water Works & Elec. of New York, particip	7	11	11
American Water Works & Elec. of New York, first preferred	..	59	60
Appalachian Power, common	..	6	4
Appalachian Power, preferred	7	20	23
Cities Service of New York, common	+extra	441	440
Cities Service of New York, preferred	6	78½	79
Commonwealth Edison of Chicago	8	109½	109½
Comm. Power, Railway & Light of Jackson, common	..	27	26
Comm. Power, Railway & Light of Jackson, preferred	6	61	60
Federal Light & Traction of New York, common	..	12	10
Federal Light & Traction of New York, preferred	..	50	50
Illinois Northern Utilities of Dixon	6	70	70
Middle West Utilities of Chicago, common	2+extra	34	34
Middle West Utilities of Chicago, preferred	6	58	58
Northern States Power of Chicago, common	..	69	67½
Northern States Power of Chicago, preferred	ex.div.7	90	91
Pacific Gas & Electric of San Francisco, common	..	68	68½
Pacific Gas & Electric of San Francisco, preferred	6	89	88
Public Service of Northern Illinois, Chicago, common	7	89	89
Public Service of Northern Illinois, Chicago, preferred	6	94	94
Republic Railway & Light of Youngstown, common	4	16	15
Republic Railway & Light of Youngstown, preferred	6	56	54
Standard Gas & Electric of Chicago, common	..	36	35
Standard Gas & Electric of Chicago, preferred	6	46	45½
Tennessee Railway, Light & Power of Chattanooga, common	..	6	6
Tennessee Railway, Light & Power of Chattanooga, preferred	6	20	20
United Light & Railways of Grand Rapids, common	4	47	46
United Light & Railways of Grand Rapids, preferred	6	74	73
Western Power of San Francisco, common	..	22	22
Western Union Telegraph of New York	extra	87	87½
Industries.			
Electric Storage of Philadelphia, common	4	88¼	91
General Electric of Schenectady	8	167¾	167½
Westinghouse Electric & Mfg. of Pittsburgh, common	7	56⅝	57